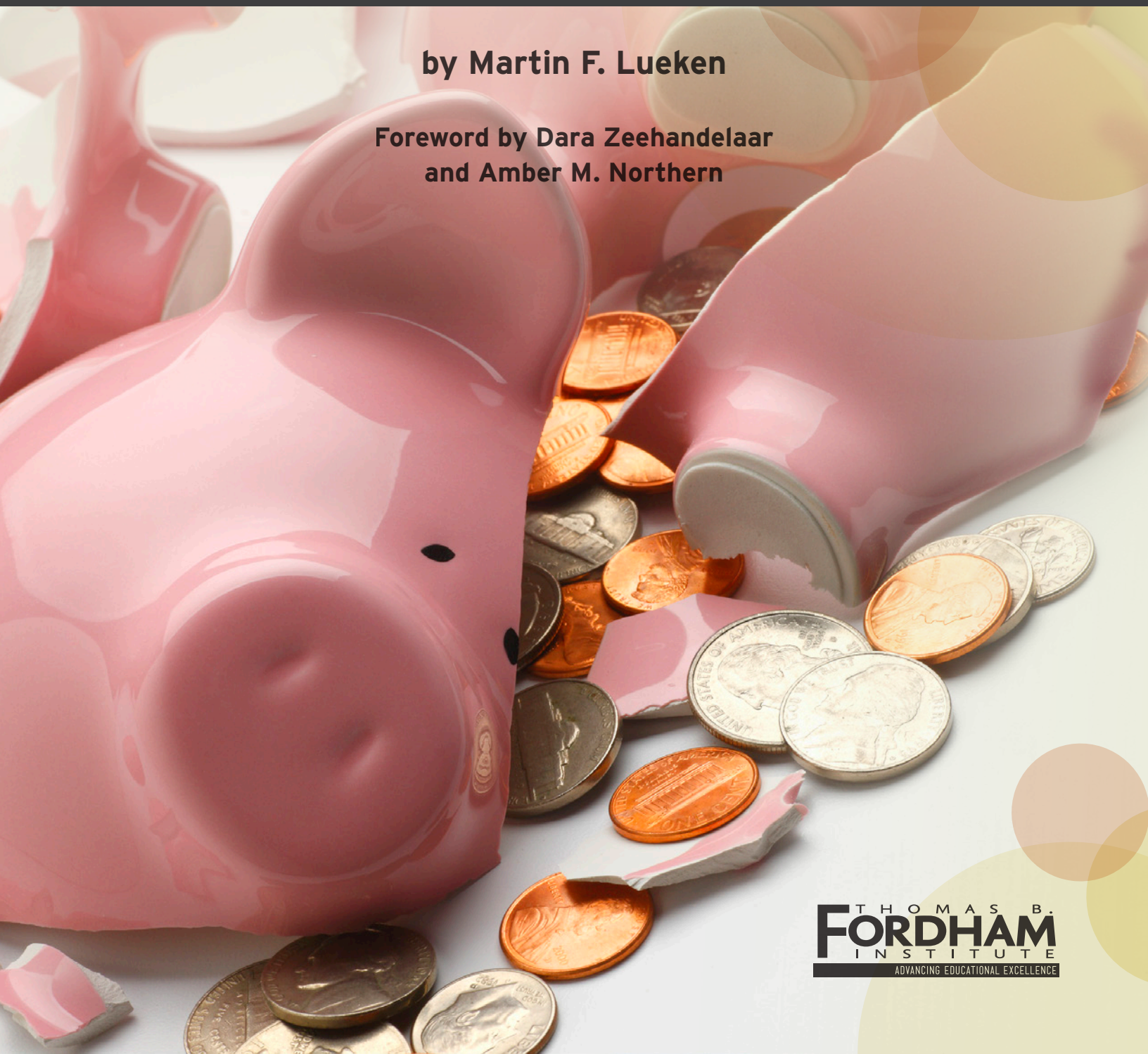
January 2017

(NO) MONEY IN THE BANK:
WHICH RETIREMENT SYSTEMS PENALIZE NEW TEACHERS?

by Martin F. Lueken

Foreword by Dara Zeehandelaar
and Amber M. Northern



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FOREWORD

By Dara Zeehandelaar and Amber M. Northern

For years, intrepid number crunchers—finance experts, economists, and pension analysts among them—have been trying, with little success, to prompt state policymakers to take action on reforming public pensions for teachers. Their efforts have included jaw-dropping numbers (*Liabilities total trillions of dollars!*), catastrophic predictions (*Districts will go bankrupt! Taxpayers will be on the hook for decades!*), dire real-world consequences for both employees and students (*Teachers will lose their jobs! Class sizes will balloon! Instruction will suffer!*), and alarming appeals for equity (*We're denying new teachers a secure retirement!*).

If only these warnings were exaggerated. But they aren't. Nor are they scare tactics cooked up by pension reformers. They're real. Consider these examples from 2016 alone: Pennsylvania taxpayers paid over $4 billion to bail out the Keystone State's teacher pension fund in the 2015–16 fiscal year, even as a major pension-reform bill failed to clear the state legislature.[1] Detroit Public Schools owes the state of Michigan $138.5 million in back pension payments and is accruing what amounts to $33,560 per day in late fees and interest; just *servicing* this debt costs the district $1,394 per student.[2] In Chicago, the dispute over not increasing teacher salaries because the funds were needed to pay for pensions became so heated that teachers nearly went on strike.[3]

Which makes it all the more tragic that most policymakers—and the public that elects them—respond to the public pension crisis with little more than a shrug. Sometimes this response is simply short-sighted: "Yes, it's a problem and something should be done, but we have more pressing issues to deal with." Other times it smacks of avoidance: "This issue is so complicated and calamitous that we're going to bury our heads in the sand. Those who come after us will have to cope." And too often, it's fearful: "If we take this on, we'll face backlash from the unions, the teachers, and much of the public."

> **"Most policymakers—and the public that elects them—respond to the public pension crisis with little more than a shrug."**

At one level, these reactions are completely understandable. Why take on a complex, costly issue that brings no short-term political gain and is sure to enrage many constituents?

The reason is that the public pension crisis is already having a negative effect on real people, and it will keep getting worse. The most conspicuous victims are new teachers, people eager to enter a profession where they can make a difference for kids. The bargain used to be that a new teacher would receive mediocre pay but could count on a comfortable retirement. Now most new teachers can expect mediocre pay and lousy benefits. Yet many of those new teachers are unaware that the job they've dreamed about doesn't fulfill its part of the bargain. They will pay a portion of those mediocre wages into a pension system, and for most, that system will later fail to provide them with any actual *benefits*. What they receive in retirement will be worth less than what they put into the system while they were in the classroom.

In this report, we calculate and document that harsh reality. We ask specifically: How long must a new teacher remain in the same retirement system until the value of her benefit exceeds the value of her contributions? We use the term "crossover point" to describe the time when that happens.

To tackle this complicated set of calculations, we recruited Martin Lueken, Director of Fiscal Policy and Analysis at the Friedman Foundation for Educational Choice (EdChoice). He has worked extensively at the intersection of education policy and economics, and his research, writing, and expertise on teacher pensions are respected across the field. Dr. Lueken examined the timing of the crossover point for a new teacher in the largest public school district in each state plus the District of Columbia. These fifty-one districts employ approximately 11 percent of U.S. teachers.

"These aren't hypothetical scenarios; they represent reality for incoming teachers in these districts."

What is distinctive about his analysis is that all calculations are based on real data. He uses retirement plan parameters (e.g., contribution rates and assumed rate of return) drawn from actual plan documents, and current teacher salaries pulled from actual district salary schedules and collective bargaining agreements. In other words, these aren't hypothetical scenarios; they represent reality for incoming teachers in these districts. In all cases, the contribution is what employees in a given district are required to pay into the retirement system,[4] grown by each system's assumed rate of return.[5] (For plan definitions and background, see *For Pension Newbies*.)

FOR PENSION NEWBIES

Most public retirement systems are structured to reward employees who remain working in a system for extended periods and can impose large costs on those who leave "too early." It is possible (and, as we show in this report, common) that a new teacher who enters a retirement system today must remain twenty years, thirty years, or even longer until the value of her retirement benefits exceeds the value of her contributions. And since pension benefits are not usually portable across state lines, teachers typically incur large mobility costs if they don't remain in a system for their entire career (and we know that few teachers do so).

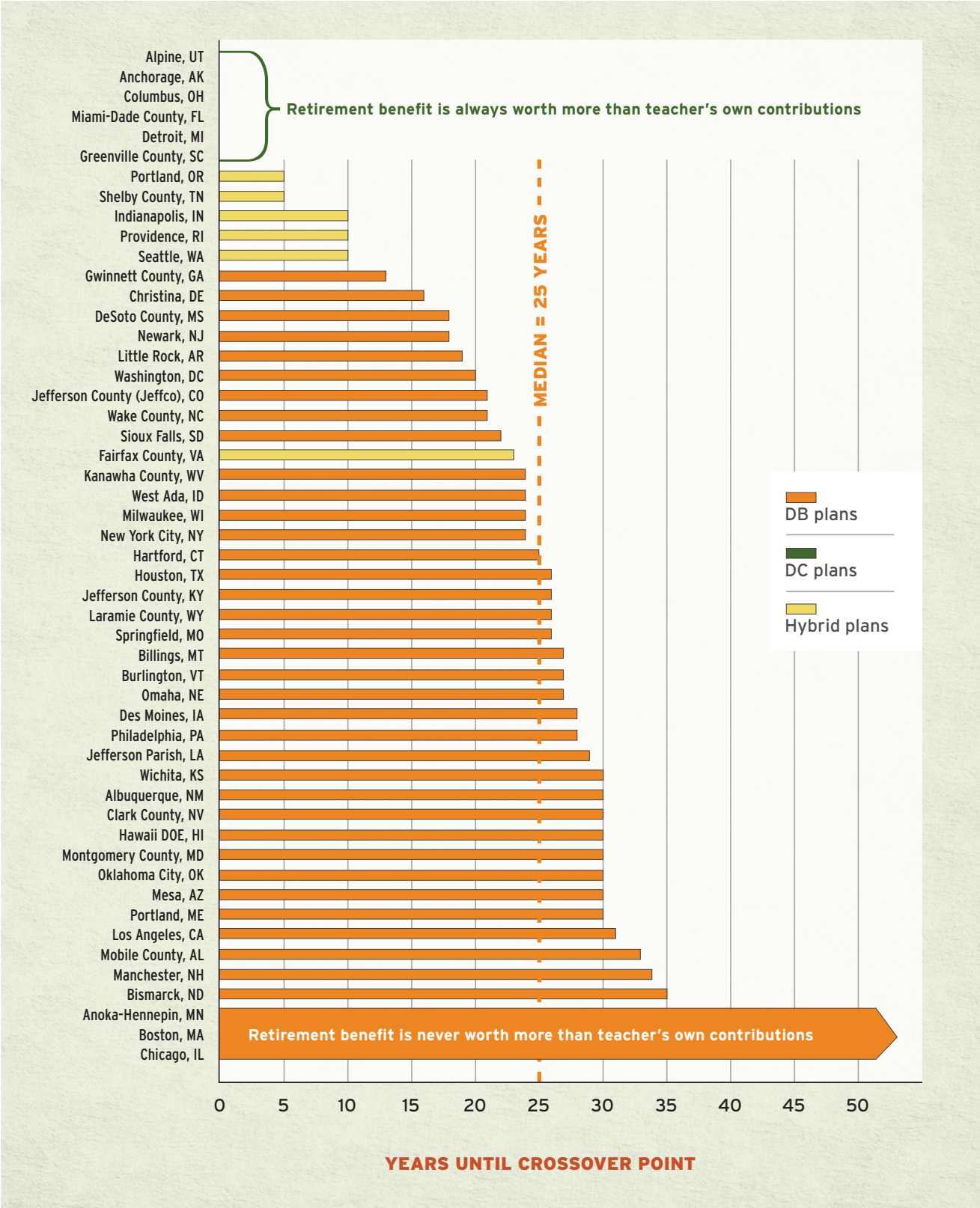
How does this work? A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to the system, and when she leaves, she receives retirement benefits. What happens next depends on the type of plan.

Traditional pension, or defined benefit (DB) plans, bear the highest penalties for leaving early. Unfortunately, they are also the norm for American teachers—forty-three states have them. In a DB plan, a teacher's benefit takes the form of pension payments: a predetermined amount of money that a teacher will receive at regular intervals for the rest of her life after retirement. Only six states offer portable, 401(k)-style defined contribution (DC) plans. Under a DC plan, a teacher's benefit is equal to her own contributions, the contributions of her employer, and investment earnings on both. Nine states offer hybrid plans, which combine a DB and DC component (we analyze six). Since teachers *must* enroll in the state's retirement system, and since thirty-nine states have no other option besides a DB plan, nearly nine in ten American teachers are enrolled in one. Since the average experience of a teacher who leaves the profession is fifteen years—and fewer than one out of four stays more than twenty years—many teachers will never see a "benefit."

The picture that emerges isn't pretty. The median crossover point of the fifty-one districts is twenty-five years (Figure ES-1). That means teachers in more than half of these districts will wait two-and-a-half decades before their retirement benefit is worth more than what they've put in themselves. For the thirty-nine traditional defined benefit (DB) plans, the median is twenty-seven years. Only five DB plans have a crossover point of fewer than twenty years—which means that, in the thirty-four other districts with DB plans, *nearly three in four teachers will leave the profession before they reach the crossover point*.[6] Or phrased another way: Since the average experience of a teacher who leaves the profession is fifteen years—and fewer than one out of four stays more than twenty years—many teachers will never see a "benefit."

"Many teachers will never see a "benefit."

FIGURE ES-1: Timing of the crossover point varies greatly across districts.



NOTE: Calculations assume a teacher enters the profession at age 25 for the 2012–13 school year, with a bachelor's degree for the first five years of her career and a master's degree for the remainder.

That's the case in Chicago (IL), Boston (MA), and Anoka-Hennepin (MN) where teachers will *never* reach a crossover point. Although they contribute 7.5 to 11 percent of their earnings to the pension system, their pension wealth will *never* be worth more than their cumulative contributions—no matter how long they stay.

It's not unfair to say that these systems now treat new teachers as sources of revenue for other people's pensions rather than valued employees in their own right. Instead of building pension wealth for those they hire to teach their pupils, they rely on pension theft. One study, for instance, finds that, "on average across state plans, over 10 percent of current teachers' earnings are being set aside to pay for previously accrued pension liabilities."[7]

"It's not unfair to say that these systems now treat new teachers as sources of revenue for other people's pensions rather than valued employees in their own right."

On the other hand, by definition, and by design, the crossover point for all six defined contribution (DC) plans is zero years: under these 401(k)-style plans, a teacher's retirement benefit is always worth more than her own cumulative contributions into the system. Teachers in Anchorage (AK), Miami-Dade County (FL), Detroit (MI), Columbus (OH), Greenville County (SC), and Alpine (UT) are covered by DC plans. (Alaska is the only state in which the DC plan is the only option; the others also have either DB or hybrid plans that teachers can choose.)

For teachers in the six hybrid plans analyzed, the median crossover point is ten years. Five districts have the hybrid plan as the only option: Portland (OR), Shelby County (TN), Providence (RI), Fairfax County (VA), and Indianapolis (IN). The sixth district is Seattle (WA), where teachers can choose between a DB and a hybrid plan. Teachers in Shelby County and Portland will reach a crossover point after just five years; teachers in Indianapolis, Providence, and Seattle reach it after ten years; Fairfax County teachers must wait twenty-three years.

So what should states, who sponsor these plans, do about this woeful state of affairs? The best recommendations aren't always new—but they're prudent. Dr. Lueken offers three: First, add a DC or other portable account-based plan (which would not defer compensation for new teachers) and allow teachers to choose which plan best meets their needs and circumstances. Second, make the more portable option the default plan. And third, increase wages and reduce benefits, since many new teachers prioritize higher salaries over deferred compensation.

Some states are already doing some of these things—but not nearly enough.

For a nation that places great emphasis on equity, it is astonishing that so many states now tacitly endorse pension systems that are inequitable to current and future generations of new teachers. All of which is even more egregious since DC options have been found to increase the retention rate of new teachers while eliminating the penalty that veterans face if they work past the year that their DB pension wealth peaks.[8]

Shrugging our shoulders helped get us into this mess. Now let's stand straight and quit political posturing as we approach pension reform in 2017.

ACKNOWLEDGMENTS

This report was made possible through the generous support of The Joyce Foundation and our sister organization, the Thomas B. Fordham Foundation.

We are especially grateful to author Martin Lueken, who deftly defined our approach to the teacher pension problem—no easy task—and then conducted the research and drafted this report. Chad Aldeman, principal at Bellwether Education Partners, and Josh McGee, vice president of public accountability at the Laura and John Arnold Foundation, provided feedback during all phases of the work. Michael Podgursky, professor of economics at the University of Missouri, consulted during the design stage.

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INTRODUCTION

Pensions are a promise made today of benefits to be received tomorrow. They reward employees, including public school teachers, who remain working in a system for extended periods, often for their entire careers. And they impose large costs on those who leave before reaching retirement eligibility—all in the hopes of encouraging them to stay. Today, however, few Americans remain at one job for their entire working lives, and teachers are no exception. Nationally, 17 percent of all teachers who started in 2007–08 were no longer in the classroom in 2011, and about 72 percent will leave before twenty years of service.[9] The reality is that the traditional retirement systems currently in place for most public school teachers favor only a small number of them and penalize many others. Teachers provide an invaluable service educating our children. Thus, an important policy goal is to ensure that teacher compensation, including pensions, works for *all* teachers.

17%

of all teachers who started in 2007–08 were no longer in the classroom in 2011

72%

of teachers will leave before twenty years of service

Consider two hypothetical teachers, Amy and Brianna. They trained in the same teacher preparation program, hold the same credentials, teach the same subject, and are similarly effective in the classroom. Both start teaching at age twenty-five and stay in the classroom for twenty years.[10] During those twenty years, both contribute to their pension fund, and when they leave both elect to receive deferred retirement benefits, which they'll begin to receive once they're old enough. The difference is that Amy teaches in Georgia's largest school district, Gwinnett County Public Schools, while Brianna spends her career in Louisiana's Jefferson Parish Public School System.

Amy will receive an estimated $156,000 in total lifetime retirement benefits, and the value of what she contributed during her tenure in the classroom is $104,000. The value of her benefit is about $52,000 *more* than the value of her contributions. Brianna, however, will receive $77,000 despite having contributed around $123,000 to the system—a net *loss* of about $46,000.[11, 12]

In this scenario, while the length of their teaching careers is identical, Amy stays long enough to see a return on her contributions of more than $50,000 while Brianna incurs a cost of almost $50,000 because she leaves. In fact, Brianna would have to stay almost thirty years before she realizes a positive return.

How is this possible? Pension benefits for public-sector employees, teachers included, depend on arbitrary parameters and rules that are set by states and districts. They're also not usually portable across state lines, so teachers typically incur large mobility costs if they don't remain in a system for their entire career.

Now consider a third teacher, Camila. She has the same training, credentials, and effectiveness as Amy and Brianna, but she spends her twenty-year career in South Carolina's Greenville County Schools. While teachers in Georgia and Louisiana work under traditional pension systems, teachers in South Carolina can choose a 401(k)-style plan. When Camila leaves teaching, her benefits total about $125,000, or $55,000 *more* than her contribution.[13] And, she can transfer the balance to another retirement account (or even withdraw it immediately, minus taxes), rather than deferring her benefits until she's older.

The differences between Amy, Brianna, and Camila result from variations in state policies that dictate the form and terms of teacher retirement systems. They also reflect the priorities of policymakers as they address (or ignore) underfunded pension systems and the lack of stable retirement options for younger teachers. Teacher pension systems alone had $500 billion in pension debt in 2014.[14] To address the shortfall, many plans increased the number of years teachers must remain in and contribute to the retirement system before qualifying for a pension, while at the same time reducing benefits for future new teachers and other public employees.[15] Because of this, a substantial number of the nation's new teachers must wait many years until their expected retirement benefits are worth more than their contributions. We refer to this as the "crossover point."[16]

"A substantial number of the nation's new teachers must wait many years until their expected retirement benefits are worth more than their contributions."

In this study, we examine the timing of the crossover point for a new teacher from the largest public school district in each state as well as the District of Columbia. These fifty-one districts employ approximately 11 percent of the nation's teachers. Our primary research question is: **How long must a new teacher work until her retirement benefits are worth more than her contributions (the crossover point)?** The results of this analysis can give new teachers in the districts we studied a clearer sense of their contribution obligations as well as the return they might expect. It also provides useful information about whether teacher retirement systems work for *all* employees, their employers, and taxpayers.

This report proceeds as follows: Section I explains the data and methods used for this analysis. Section II presents the findings. Section III discusses implications and policy recommendations.

Since readers will have varying knowledge about public pension plans, *Appendix A* provides an overview of those plans (including key terms) and how they impact the crossover point as well as a summary of existing research on the topic. Some readers may opt to tackle this section first. *Appendices B* and *C* include additional technical details. For a full profile of each district, including plan parameters, please see our *District Profiles* following the *Endnotes*.

SECTION I. DATA AND METHODS

This study asks: For the largest school district in each state, plus the District of Columbia, how long must a new teacher work until her retirement benefits are worth more than her contributions (the crossover point)?

For teachers in "defined benefit" (DB) plans, benefits are equal to "pension wealth," or the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy conditional on the age of separation.[17, 18] The contribution is the employee's required input, grown by each system's assumed rate of return. For teachers in "defined contribution" (DC) plans, benefits are equivalent to the value of a teacher's retirement account: her and her employer's contributions, plus any gains (or losses) from investment performance over time. Retirement benefits under a "hybrid" plan combine the two.[19, 20]

"This study asks: For the largest school district in each state, plus the District of Columbia, how long must a new teacher work until her retirement benefits are worth more than her contributions (the crossover point)?"

The calculations reported here require information about retirement plan parameters and teacher salaries, along with assumptions about what a representative teacher looks like. The plan parameters include the type of retirement system, vesting period, employee and employer contribution rates, refund rules, retirement eligibility requirements, and assumed rate of return on investments.[21] These values are drawn either directly from the plans themselves via their websites and/or from member handbooks, or (where available) from a database assembled by the National Council on Teacher Quality (NCTQ).[22] As needed, we contacted plan administrators to provide, clarify, or verify information. Teacher salaries were gathered directly from each district's salary schedule, which was available on district websites, via the NCTQ Teacher Contract Database, or by request from the district. Salary information was supplemented by collective bargaining agreements or employment policies.[23]

Calculations assume a teacher enters the profession at age twenty-five in the 2012–13 school year, with a bachelor's degree for the first five years of her career and a master's degree for the remainder.[24] The survival probabilities (needed to calculate expected lifetime pension wealth) are drawn from the *2007 CDC Life Tables*.[25] We use each plan's own assumed rate of investment returns and grow contributions by each system's rate, and assume inflation at 2.5 percent.

We also estimate crossover points under assumptions for the real interest at 4 percent (6.5 percent nominal) and 5.5 percent (8 percent nominal). Results under these alternative assumptions are reported in *Results Using Different Discount Rates* (sidebar, page 19) and in *Appendix C*.

The largest district by enrollment in each state was determined using data from the National Center for Education Statistics database for the 2012–13 school year. These fifty-one districts employ approximately 11 percent of the nation's teachers.[26] Our calculations are made at the district level because retirement benefits vary as a function of teacher salary, and salaries vary by district. We also chose the district as the unit of analysis because, while the majority of public retirement plans that cover teachers are sponsored by state governments, a handful are sponsored by local governments—teachers in New York City (NY), Chicago (IL), Omaha (NE), Gwinnett County (GA), and Fairfax County (VA) have their own plans. Our strategy allows accurate capture of the crossover point for teachers regardless of whether their plan is state or local. A more formal treatment of these methods is presented in *Appendix B*. Also see *Complementary Work* for discussion of a similar study.

COMPLEMENTARY WORK

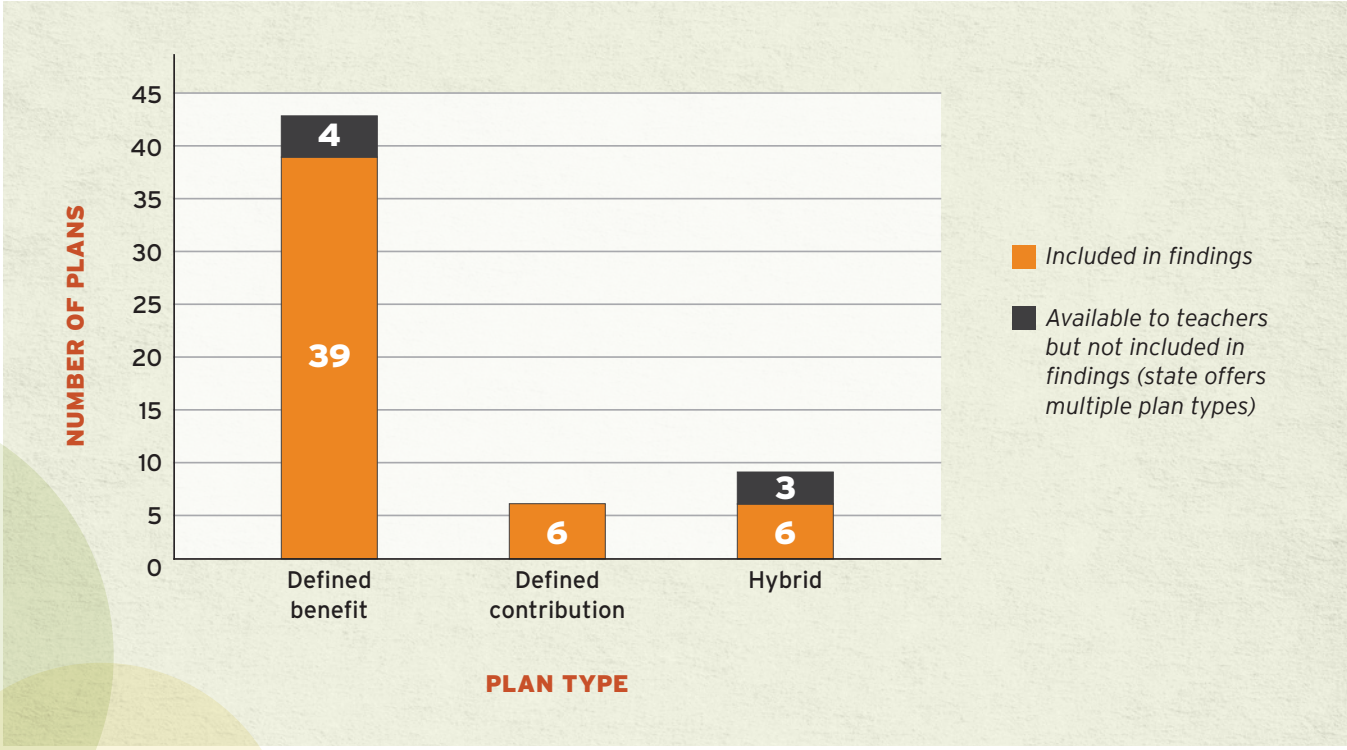
Others have examined related questions using similar but not identical methods. Most relevant is a 2015 report by Bellwether Education Partners and the Urban Institute, *Negative Returns: How State Pensions Shortchange Teachers*, which estimated the crossover point for all state-sponsored public employee pension plans.[27] Our study differs in several ways.

First, our unit of analysis is each state's largest school district, while theirs is the state as a whole. Because of this, we use each district's most recently available salary tables for our calculations. Thus, our calculations for both contributions and pension benefits, which are based on salary, accurately reflect district-level crossover points by using actual salaries and by accounting for non-linear salary growth and longevity bonuses. In contrast, *Negative Returns* applies a single hypothetical salary schedule to all plans. We are also able to capture accurate crossover points for teachers in five districts that are covered by municipal plans.[28]

Second, for systems that offer a choice of different plans, we choose the most portable plan, while the related analysis included only defined benefit (DB) plans. Finally, we take a forward-looking approach by considering only plans that apply to newly hired teachers. Despite these differences, our findings are broadly in line with those reported in *Negative Returns*.[29]

This study includes fifty-one districts offering fifty-eight retirement plans (see Figure 1). Teachers in six districts can choose the type of retirement plan they enroll in. For instance, teachers in South Carolina's Greenville County Schools can enroll in either a traditional DB or a DC plan. Teachers in Ohio's Columbus City Schools may choose among a traditional DB, DC, and hybrid plan.[30] For districts where teachers have options, we calculate the crossover point for all available plans but report only the one under which the crossover point will most likely occur the earliest in a teacher's career (DC plans, then hybrid, and finally DB).

FIGURE 1: Most teachers are enrolled in traditional defined benefit plans.



SECTION II. FINDINGS

Figure 2 shows the crossover points for the fifty-one plans included in this study. For teachers in more than half of these districts, a crossover point doesn't occur until at least twenty-five years of service. Thirty-five of fifty-one plans have crossover points of twenty years or more. Put in perspective: **Newly hired teachers in the majority of districts will be covered by retirement plans designed so that they will contribute more to retirement than the value of their benefits—*for nearly an entire career.***

The median crossover point for all fifty-one plans in the study is twenty-five years (see Table 1).

TABLE 1: Median crossover point, by plan type

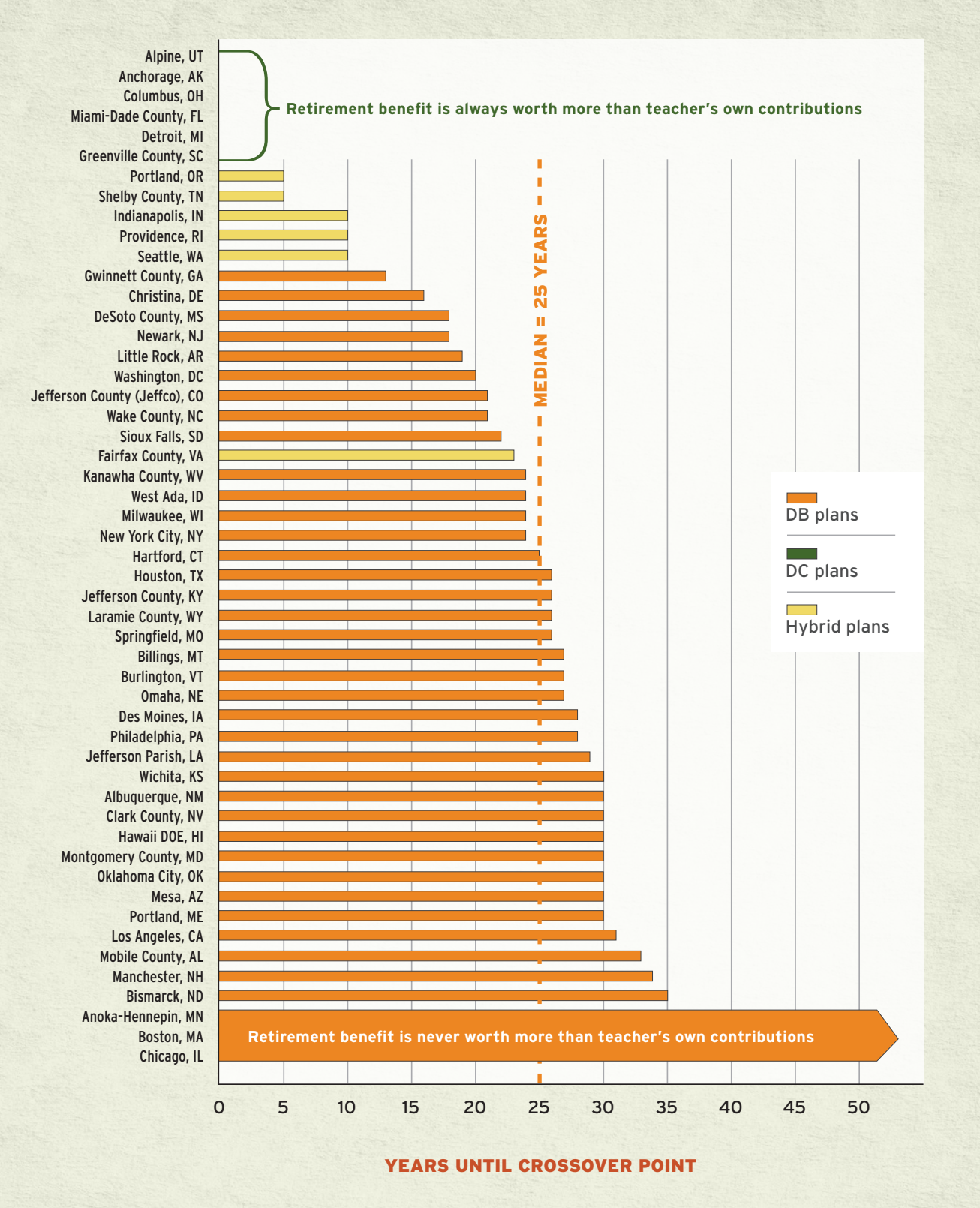
PLAN TYPE	MEDIAN (YEARS)
All plans	25
DB plans	27
DC plans	Crossover is immediate
Hybrid plans	10

There is considerable variability in the timing of the point, however. For the thirty-nine traditional DB plans, the median is twenty-seven years. In thirty-four of these districts, nearly three in four teachers will leave before they reach the crossover point, while only five have a crossover point earlier than twenty years.[31] And teachers in Chicago (IL), Boston (MA), and Anoka-Hennepin (MN) will never reach a crossover point.[32, 33] Although teachers in these three districts contribute between 7.5 percent and 11 percent of their earnings to the pension system, their pension wealth will *never exceed* their cumulative contributions—no matter how long they stay.[34] Unfortunately, teachers in these districts don't have better options—enrollment in the pension plan for public employees is mandatory.[35]

The crossover point for all six DC plans analyzed is zero years, because since retirement benefits are directly tied to contributions they always exceed them. These plans cover teachers in Anchorage (AK), Miami-Dade County (FL), Detroit (MI), Columbus (OH), Greenville County (SC), and Alpine (UT). (Alaska is the only state in which the DC plan is not optional; the others have either DB or hybrid plans as well.)

For teachers in the six hybrid plans analyzed, the median crossover point is ten years. Five districts have the hybrid plan as the only option: Portland (OR), Shelby County (TN), Providence (RI), Fairfax County (VA), and Indianapolis (IN). The sixth district we analyzed is Seattle (WA), where teachers can choose between a DB and hybrid plan.[36]

FIGURE 2: Timing of the crossover point varies greatly across districts.



NOTE: Calculations assume a teacher enters the profession at age 25 for the 2012–13 school year, with a bachelor's degree for the first five years of her career and a master's degree for the remainder.

Shelby County (TN) and Portland (OR) teachers will reach a crossover point after just five years; this timing corresponds to the plans' vesting requirements. Teachers in Indianapolis (IN), Providence (RI), and Seattle (WA) reach the crossover point after ten years; Fairfax County (VA) teachers must wait twenty-three years.

Table 2 presents the number of years that pass before the crossover point occurs for each district, organized alphabetically by state. The table also shows plan type, vesting requirement, and whether teachers enroll in Social Security.[37]

TABLE 2: Time to crossover point and selected plan parameters

State	District	Years to crossover	Available plan types[a]	Vesting requirement (in years)	Teachers enroll in Social Security	Employee contribution (excludes Soc. Sec.)[b]
Alabama	Mobile County Public School System	33	DB	10	Yes	6.00%
Alaska	Anchorage School District	0	DC	5	No	8.00%
Arizona	Mesa Public Schools	30	DB	0	Yes	11.35%
Arkansas	Little Rock School District	19	DB	5	Yes	6.00%
California	Los Angeles Unified School District	31	DB	5	No	8.00%
Colorado	Jefferson County Public Schools	21	DB	5	No	8.00%
Connecticut	Hartford Public Schools	25	DB	10	No	6.00%
Delaware	Christina School District	16	DB	10	Yes	5.00%
District of Columbia	District of Columbia Public Schools	20	DB	5	No	8.00%
Florida	Miami-Dade County Public Schools	0	DB, **DC**	1	Yes	3.00%
Georgia	Gwinnett County Public Schools	13	DB	10	No[c]	7.00%
Hawaii	Hawaii State Department of Education	30	DB	10	Yes	8.00%
Idaho	West Ada School District	24	DB	5	Yes	6.79%

CONTINUED...

TABLE 2: Time to crossover point and selected plan parameters

State	District	Years to crossover	Available plan types[a]	Vesting requirement (in years)	Teachers enroll in Social Security	Employee contribution (excludes Soc. Sec.)[b]
Illinois	Chicago Public Schools	Infinite	DB	10	No	9.00%[d]
Indiana	Indianapolis Public Schools	10	Hybrid	10	Yes	3.00%
Iowa	Des Moines Public Schools	28	DB	7	Yes	5.95%
Kansas	Wichita Public Schools	30	DB[e]	5	Yes	6.00%
Kentucky	Jefferson County Public Schools	26	DB	5	No	12.86%
Louisiana	Jefferson Parish Public School System	29	DB	5	No	8.00%
Maine	Portland Public Schools	30	DB	5	No	7.65%
Maryland	Montgomery County Public Schools	30	DB	10	Yes	7.00%
Massachusetts	Boston Public Schools	Infinite	DB	10	No	11.00%
Michigan	Detroit Public Schools Community District	0	**DC**, Hybrid	4	Yes	8.00%
Minnesota	Anoka-Hennepin School District	Infinite	DB	3	Yes	7.50%
Mississippi	DeSoto County School District	18	DB	8	Yes	9.00%
Missouri	Springfield Public Schools	26	DB	5	No	14.50%
Montana	Billings Public Schools	27	DB	5	Yes	8.15%
Nebraska	Omaha Public School District	27	DB	5	Yes	9.78%
Nevada	Clark County School District	30	DB	5	No	12.25%
New Hampshire	Manchester School District	34	DB	10	Yes	7.00%

CONTINUED...

TABLE 2: Time to crossover point and selected plan parameters

State	District	Years to crossover	Available plan types[a]	Vesting requirement (in years)	Teachers enroll in Social Security	Employee contribution (excludes Soc. Sec.)[b]
New Jersey	Newark Public Schools	18	DB	10	No	6.78%
New Mexico	Albuquerque Public Schools	30	DB	5	Yes	10.70%
New York	New York City Department of Education	24	DB	10	Yes	3.00% to 6.00%
North Carolina	Wake County Public School System	21	DB	5	Yes	6.00%
North Dakota	Bismarck Public School District	35	DB	5	Yes	11.75%
Ohio	Columbus City Schools	0	DB, **DC**, Hybrid	0	No	10.00%
Oklahoma	Oklahoma City Public Schools	30	DB	5	Yes	7.00%
Oregon	Portland Public Schools	5	Hybrid	5	Yes	6.00%
Pennsylvania	The School District of Philadelphia	28	DB	10	Yes	7.50%
Rhode Island	Providence Public School District	10	Hybrid	5	No	10.75%[f]
South Carolina	Greenville County Schools	0	DB, **DC**	0	Yes	8.00%
South Dakota	Sioux Falls School District	22	DB	3	Yes	6.00%
Tennessee	Shelby County Schools	5	Hybrid	5	Yes	7.00%[g]
Texas	Houston Independent School District	26	DB	5	No	7.70%
Utah	Alpine School District	0	**DC**, Hybrid	4	Yes	None required
Vermont	Burlington School District	27	DB	5	Yes	6.00%
Virginia	Fairfax County Public Schools	23	Hybrid[h]	5	Yes	8.00%

CONTINUED...

TABLE 2: Time to crossover point and selected plan parameters

State	District	Years to crossover	Available plan types[a]	Vesting requirement (in years)	Teachers enroll in Social Security	Employee contribution (excludes Soc. Sec.)[b]
Washington	Seattle Public Schools	10	DB, **Hybrid**	10	Yes	5.00%
West Virginia	Kanawha County Schools	24	DB	5	Yes	6.00%
Wisconsin	Milwaukee Public Schools	24	DB	5	Yes	6.60%
Wyoming	Laramie County School District	26	DB	4	Yes	8.25%

NOTES: Parameters were obtained from plan documents and the National Council for Teacher Quality.

a - DB=defined benefit plan, DC=defined contribution plan. For districts that offer multiple plans, we compute the crossover point under the one that offers the greatest portability—DC, hybrid, then DB. The plan we analyzed is indicated in bold.

b - The contribution rate for teachers in DC plan equals the minimum required rate for employee contributions.

c - Enrollment in Social Security for teachers in Georgia depends on where the teacher is employed; teachers in Gwinnett County Public Schools do not enroll in Social Security and instead receive a supplemental plan to replace Social Security benefits.

d - Chicago Public Schools "picks up" a portion of the employee contribution.

e - Kansas teachers hired on or after July 1, 2009 and before January 1, 2015 belong to School Tier 2—a defined benefit plan—which is the plan analyzed in this report as all results are based on retirement plan rules as they apply to new hires who began in FY13. Kansas teachers hired on or after January 1, 2015 belong to School Tier 3, a cash balance plan.

f - Teachers in Rhode Island who are not enrolled in Social Security contribute 7 percent to the DC portion of the plan; the employer contributes 3 percent. This is the scenario we analyze. If enrolled in Social Security, the employee contribution rate is 5 percent and the employer rate is 1 percent.

g - Plan parameters are for teachers in the state's "Hybrid Plan." Depending on date of hire, teachers may instead be in the "Legacy Plan." Both are hybrids.

h - Teachers hired after January 1, 2014 but not yet vested as of that date enroll in a hybrid plan; teachers hired or rehired on or after July 1, 2010 (or hired before that date but not yet vested as of January 1, 2013) enroll in a traditional defined benefit plan.

The table also illustrates some of the provisions of retirement plans, and variations among them. For example, employee contribution rates, which are generally set by state law, range from 3 percent—Miami-Dade County (FL) and Indianapolis (IN)—to more than 12 percent—Clark County (NV), Jefferson County (KY), and Springfield (MO). Generally, teachers in districts with lower employee contribution rates to the retirement fund are also enrolled in Social Security, although that's not always the case. For DB plans, or the DB portion of hybrid plans, vesting periods range from immediate—Mesa Public Schools (AZ)—or only three years—Sioux Falls (SD) and Anoka-Hennepin (MN) School Districts—to ten years (sixteen districts, including Boston, Chicago, Philadelphia, Seattle, and New York City). Plans also vary in other parameters as well: the number of years included in a teacher's final average salary, the rules for retirement eligibility, and the assumed rate of return (see *Results Using Different Discount Rates*), among others.

RESULTS USING DIFFERENT DISCOUNT RATES

In keeping with the spirit of using real plan parameters, salaries, and other inputs as much as possible, our calculations use each plan's own assumptions about the rate of return on investments (usually between 7 percent and 8 percent). Not only do these assumptions vary from plan to plan, but financial economists also argue that they understate the risk taken on by the plans themselves—so they recommend using lower rates of return when calculating the present value of benefits.[38] In addition to those reported in Table 2, we also calculate the crossover points using discount rates of 6.5 percent (more realistic), 8 percent (approximately what the plans currently assume) and 9.5 percent (less realistic). With a couple of exceptions, using 6.5 percent results in crossover points that still don't occur until well after a decade of teaching. The results are summarized in Table 3 and presented in full in *Appendix C*.

TABLE 3: Median crossover point (in years) under different discount rates by plan type

Plan type	6.5 percent	8.0 percent	9.5 percent
All plans	20	27	31
DB plans	21.5	28	Infinite
DC plans	0	0	0
Hybrid plans	5	10	10

The following sections contain general findings by plan type along with illustrative examples. For a full profile of each district, including plan parameters, please see our *District Profiles* following the *Endnotes*.

DEFINED BENEFIT PLANS

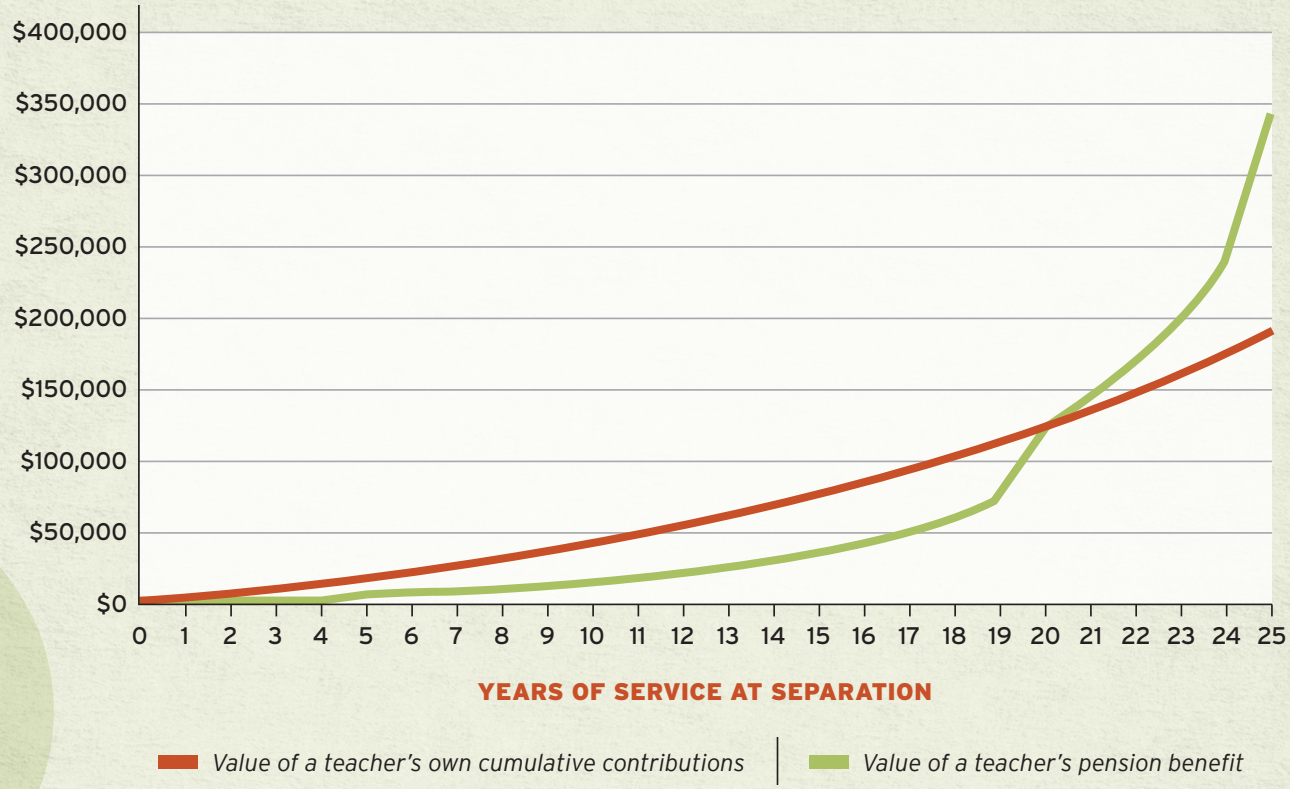
For the thirty-nine districts with DB plans, the median crossover point for new teachers is twenty-seven years. Only one—Gwinnett County Public Schools (GA)—has a crossover point of fewer than fifteen years. Teachers in thirty-four districts must wait twenty or more years, and teachers in fifteen districts must wait thirty or more years, to reach the point at which their expected pension wealth finally exceeds the value of their contributions. And in three—Chicago (IL), Boston (MA), and Anoka-Hennepin (MN)—it doesn't matter how long a teacher stays. She will *never reach* a crossover point.

Because of the structure of a DB plan, a teacher who "separates from the system" before the crossover point is placed at a financial disadvantage because she realizes no net benefits, and many DB plans expect (and even capitalize on) this. Specifically, many teacher pension systems

are banking on not only meeting their target rate of return, but they are expecting that a significant portion of teachers leave before reaching retirement eligibility. That is, they count on a large number of early departures from their system in order to help subsidize the larger benefits earned by the smaller group of teachers who remain long enough to reach retirement eligibility.[39] The result is that while some teachers remain in the system long enough to see their benefits peak (i.e., they stay until reaching retirement eligibility), many more teachers end up leaving the system before their benefits become significantly more valuable.

Jefferson County Public Schools (Jeffco) in Colorado provides an example of how a DB plan functions. Jeffco teachers enroll in the Colorado Public Employees' Retirement Association (PERA). Each year, a teacher contributes 8 percent of her earnings to the pension fund. The red line in Figure 3 tracks the total amount she has contributed at any given point in her career.

FIGURE 3: A new teacher in Colorado's Jefferson County Public Schools must remain in the pension system for twenty-one years before she realizes a return on her contributions.



NOTES: Calculations assume inflation of 2.5 percent, a real interest rate of 5 percent (Colorado assumes a 7.5 percent rate of return on investments), and a female teacher first hired in FY13 with an entry age of twenty-five who earns a master's degree after five years of service.

HOW TO READ THIS GRAPH: The green line is a Jeffco teacher's expected lifetime pension benefits (pension wealth) should she separate from the system at a given age. The red line shows the value of her cumulative contributions to the system up to that point. Where the red line lies above the green, the total amount the teacher has contributed to the pension fund is worth more than her expected benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefit is worth more than her contributions and her net benefit is positive. The crossover point is where the green line crosses the red; a Jeffco teacher must remain in the retirement system until that point—in this case, twenty-one years of service—in order to receive any return on her contributions after retirement.

The vesting requirement for PERA is five years, meaning she must remain in the system for five years before she becomes eligible to collect any pension benefits (which she will receive once she meets the age and eligibility requirements for retirement—age sixty-five with any years of service, age fifty-eight with thirty years of service, or at any age with thirty-five years of service). Upon retirement, her pension benefit equals the product of her final average salary (the average of the last three years of her annual earnings), her number of creditable service years, and a 2.5 percent multiplier. The green line in Figure 3 is her pension wealth—the total benefits she can expect to accrue over the rest of her life, should she separate from the system after the given number of years of service.

Her pension behaves like a typical DB pension plan: Her pension wealth is zero until she vests after five years of service (in this example, at age thirty). During the period she's not vested (between zero and five years of service, or twenty-five and thirty years of age), she contributes a total of over $11,500 to the system without being able to collect any benefits.

> **"A teacher who separates from a DB plan before the crossover point realizes no net benefits."**

Once vested, pension wealth adds up at an increasing rate. The abrupt changes in pension wealth correspond to points where she meets various retirement eligibility milestones. They also represent points in her career where she sees spikes in her salary: Jeffco teachers do not get a yearly raise between twelve and fifteen years of service, after which they receive a 7.5 percent salary increase.[40]

While her pension wealth grows the longer she stays, she must wait twenty-one years (in this case, until age forty-six) to reach the crossover point where her lifetime expected pension wealth is finally worth more than the total of what she's contributed to the system. At this point, her contribution to PERA is worth approximately $135,000 and her pension wealth is about $143,000 (a net benefit of approximately $8,000). If she stays in the system just one more year, her net benefit jumps to nearly $24,000. And if she has twenty-five years of service, her net benefit is nearly $150,000.

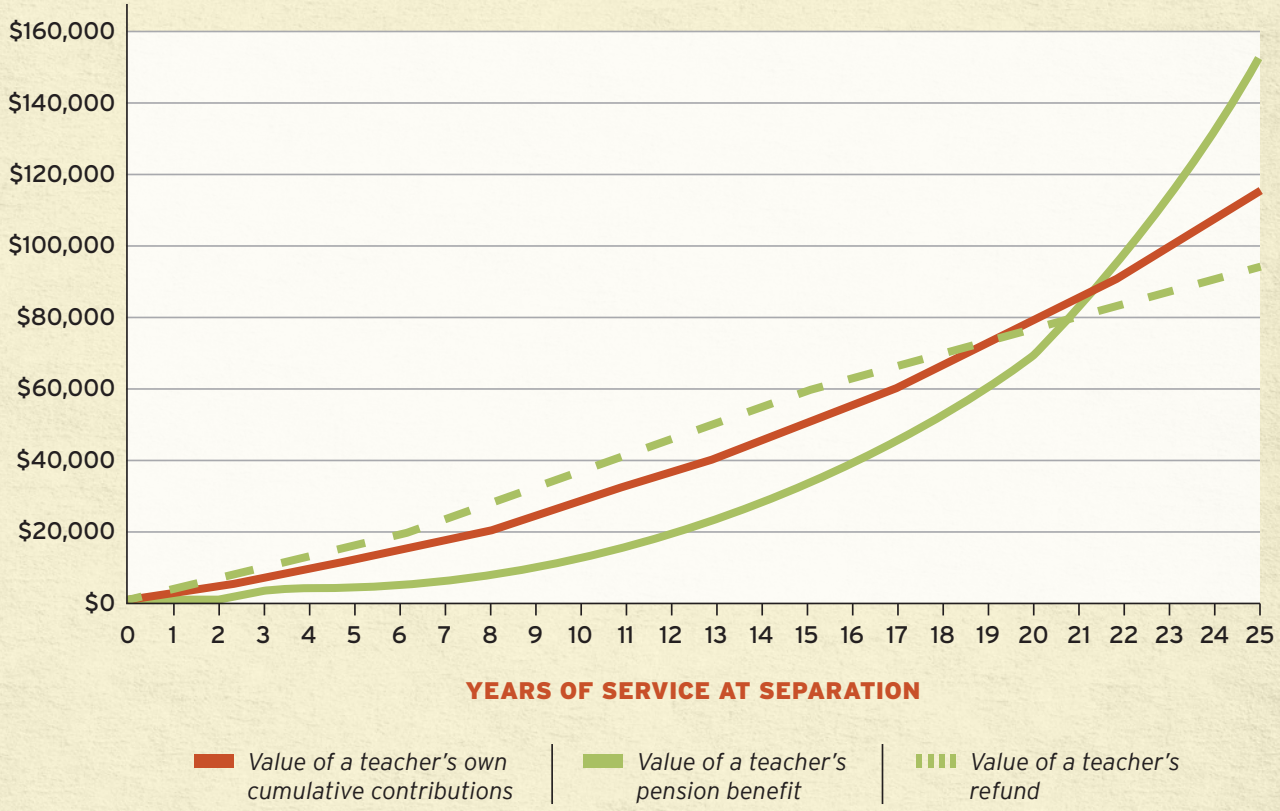
Of course, no matter when she leaves she can choose to "cash out" and receive a refund.[41] For a Jeffco teacher, the refund is what she put in: 8 percent of her earnings plus interest. Because Colorado teachers are not enrolled in Social Security, she has no other retirement savings, and receiving a refund could mean she's taking on more risk if she's not saving enough based on her life circumstances and personal retirement goals. She would have a greater degree of retirement security if she could also take with her at least a portion of the employer contributions as part of her refund, or if she had Social Security, but this is not the case in Colorado. She is essentially locked in. (See *Portability in DB Plans? The Unique Case of South Dakota* for a rare exception to this lack of portability in DB plans.)

PORTABILITY IN DB PLANS? THE UNIQUE CASE OF SOUTH DAKOTA

Our analysis focuses solely on pension wealth accrual and does not factor in refund benefits. Recall a teacher can "cash out" of her retirement system at any point and receive an immediate refund of her own contributions, sometimes with interest, but rarely with a portion of her employer's contributions. Including refund benefits would likely affect the crossover point only in a few cases because refunds rarely include a portion of the employer's contribution.

The South Dakota Retirement System, which covers teachers in the Sioux Falls School District, is that rare exception. It offers substantially greater refund benefits than any other plan in our analysis. It is a traditional DB plan, so pension wealth grows in typical fashion—slow in the beginning of a teacher's career, then increasing in pace during the latter years. Teachers and the employer each contribute 6 percent of earnings.

FIGURE 4: Because a Sioux Falls teacher's refund contains part of the employer contribution, a new teacher is not penalized for leaving. Early in her career, her refund is worth more than her contribution; later, her pension benefit is greater than her contribution.



NOTE: Calculations assume inflation of 2.5 percent, a real interest rate of 5 percent, and a female teacher first hired in FY13 with an entry age of twenty-five who earns a master's degree after five years of service.

CONTINUED...

However, for teachers who opt to receive a refund *in lieu* of a pension, the plan refunds not only the employee's own contributions but also 50 percent of the employer's contributions for teachers who leave before vesting (three years) and 85 percent of the employer's contributions for teachers who leave after vesting. The refund benefit for vested teachers amounts to 11.1 percent of creditable earnings, plus interest. If we add the refund benefit to pension wealth, then the crossover point disappears: teachers who leave early and opt for a refund instead of a pension will receive *more* than they contribute to the pension fund.[42] What does this mean for teachers? Despite the fact that they are in a traditional DB plan, South Dakota teachers face less risk than many of their colleagues in other states.

This feature is depicted in Figure 4, which graphs the value of a representative teacher's cumulative contributions (red), pension wealth (solid green), and refund benefit (dashed green). The crossover point occurs after twenty-two years of service (age forty-seven), when the value of a teacher's pension wealth (green) exceeds the value of her cumulative contributions (red). The dashed green line represents her refund benefit, and its value is greater than the teacher's cumulative contributions (red) for most of her career. The gap grows during the first ten years of a teacher's career, but eventually narrows and then closes at twenty-one years of service (age forty-six).[43] This feature makes South Dakota's pension plan more equitable to mobile early-career teachers than most other traditional DB plans.

Unfortunately, the South Dakota plan is unusual among traditional DB plans with respect to its portability and equity. Typically, teachers who leave before reaching retirement eligibility and opt for a refund will receive only their own contributions. They will not be able to claim any portion of the employer contributions.

DEFINED CONTRIBUTION PLANS

The trajectory of contributions and benefits under a DC plan are fundamentally different than that of a DB plan. Most importantly, **teachers will always have a retirement benefit that is worth more than than their cumulative contribution; under a DC plan, the crossover point is zero.**

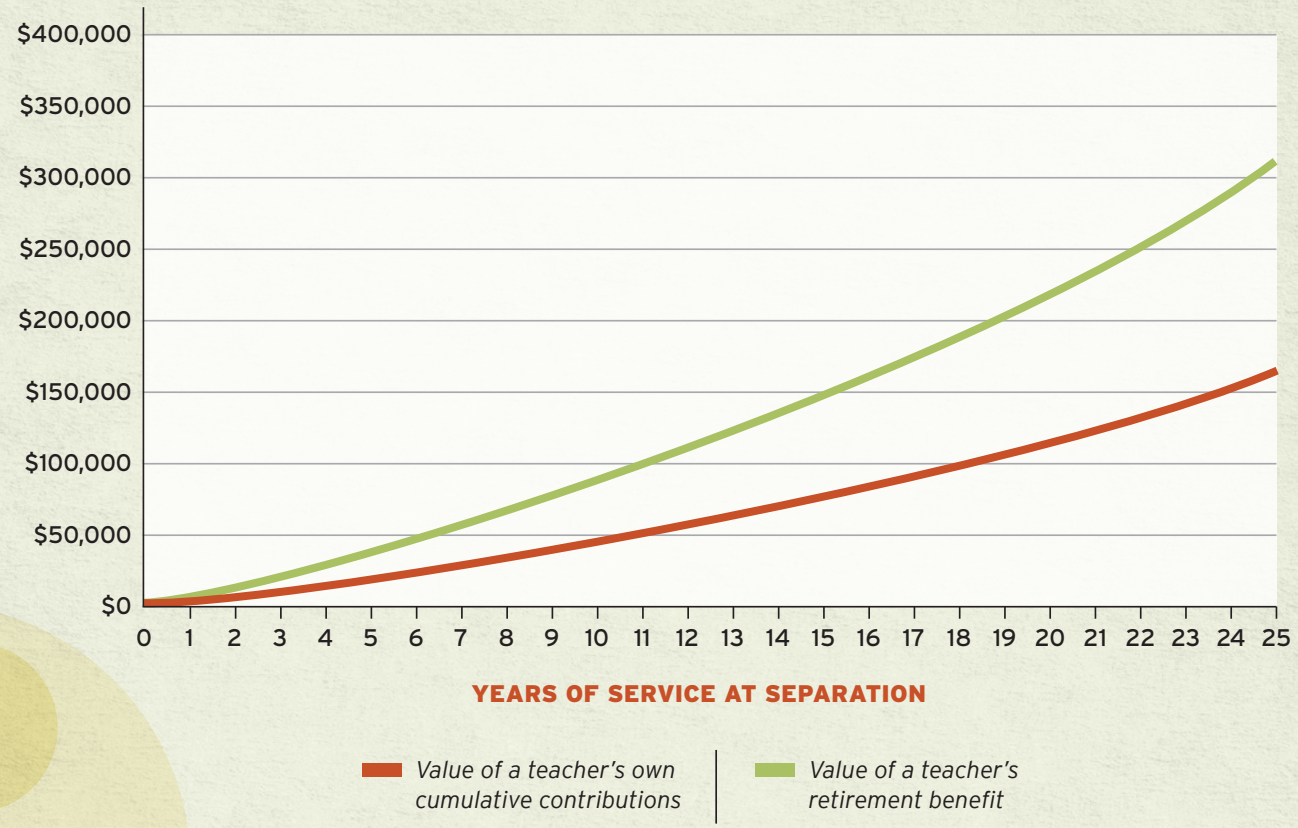
This is because regardless of when teachers leave the system, their retirement benefits comprise their own contribution plus additional earnings on the investment, plus (assuming they have vested) their employer's contribution plus investment earnings. The DC plan does not penalize mobile teachers or those who decide teaching is not for them. Nor does it incentivize veterans to stay in a system for financial reasons, even if they're ready to leave. Recall that, under a DB plan, a teacher can leave the system at any time but, unless she is eligible to retire (and willing to wait until she reaches retirement age to receive pension benefits), she receives a lump-sum payment that

> **"A DC plan does not penalize mobile new teachers, nor does it lock in veterans who are otherwise ready to leave."**

is equal *only* to her own contributions plus some interest. DB plans are not portable and have a high degree of deferred compensation. DC plans are the opposite—they are portable and a teacher has a positive net benefit as soon as she starts.

Anchorage illustrates this clearly. Teachers in the Anchorage School District enroll in Alaska's Teacher Retirement System Defined Contribution Retirement (TRS DCR) plan. Under the plan's provisions, teachers contribute 8 percent of their earnings to a personal retirement account while the employer contributes 7 percent. As with any DC plan, a teacher's retirement benefit is always equal to the balance of her account: the sum of the contributions, plus investment earnings (the green line in Figure 5).[44] The red line depicts the teacher's own cumulative contributions.

FIGURE 5: A new teacher in the Anchorage School District will always have a retirement benefit that is greater than her cumulative contribution.



NOTES: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of twenty-five.

For an Anchorage teacher, the crossover point is zero; her benefit is immediately worth more than her contributions.[45] Specifically, under the TRS DCR plan, her benefit is equal to her own contributions plus investment earnings, plus some or all of her employer's contribution, plus investment earnings. She vests in the employer contributions (plus investment earnings) gradually: 25 percent after two years, 50 percent after three years, 75 percent after four years, and 100 percent after five years. Thus, after year one, she will receive what she contributed during the year, plus earnings from investments. After five years, her cumulative contributions equal $17,511 and her employer's cumulative contributions are $16,128. Her account balance (with investment earnings) is $37,040, more than double what she has contributed so far. After twenty-five years of service, she has put in $69,250, and her account balance is $271,829, nearly four times what she has contributed so far. At all points in her career, her retirement benefit (or account balance) is always worth more than what she puts in.

HYBRID PLANS

Hybrid plans combine a DB pension and a DC retirement account. Their general form is that teachers are always eligible to receive the balance of the DC portion of their benefits, while they must vest into the DB portion. While they offer increased portability in comparison to pure DB plans, they do have crossover points, while pure DC plans do not.

> **"Hybrid plans are more portable than pure DB plans, but unlike pure DC plans they do have a crossover point."**

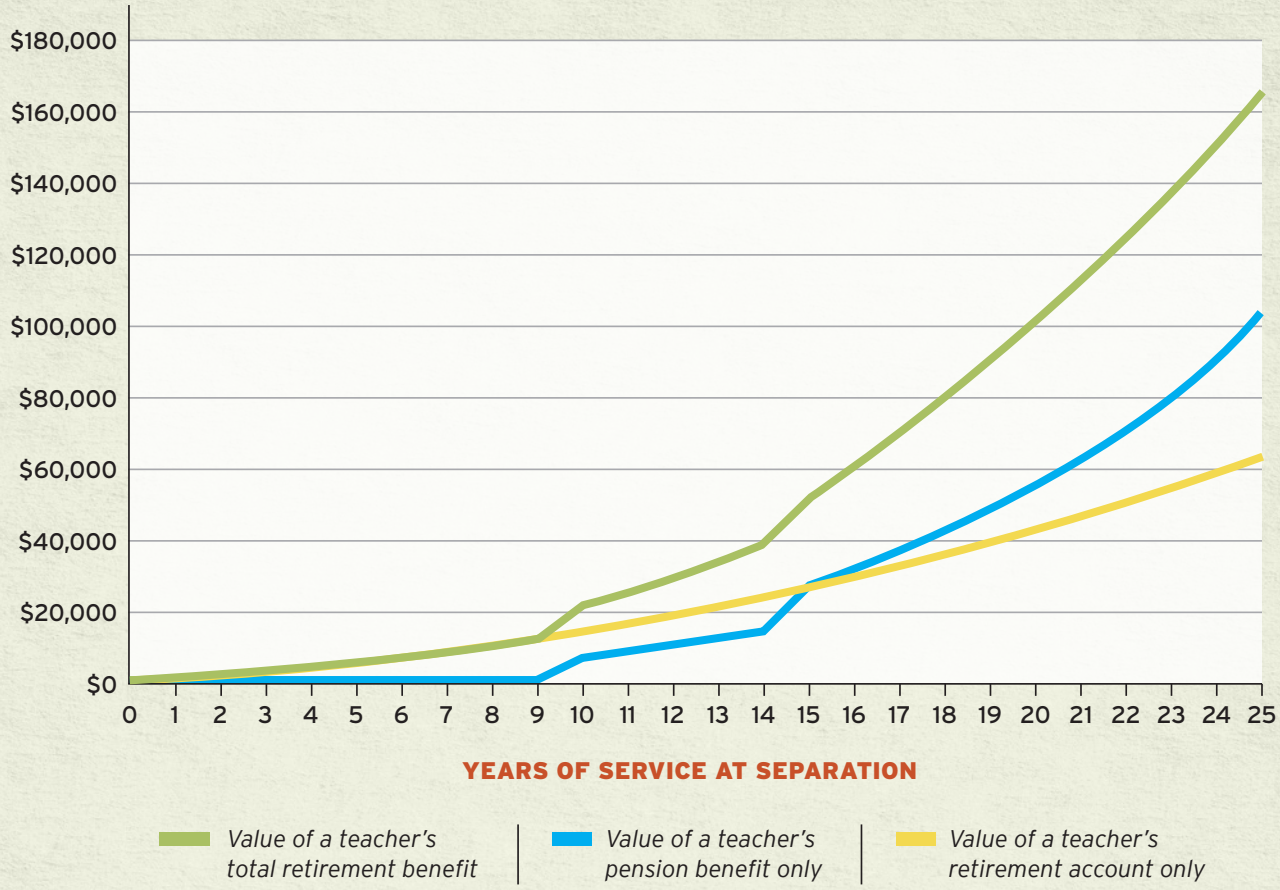
There are several factors that influence the timing of the crossover point in hybrid plans: the vesting requirement of the DB portion of the plan, the distribution of employee and employer contributions between the DB and DC portions, and the total amount contributed to the DC portion.

The crossover point often coincides with the vesting requirement in the DB portion of the plans, as is the case in four of the six hybrid plans we examined. For example, the crossover points for teachers in Indianapolis (IN) and Seattle (WA) who opt into a hybrid plan is ten years, which is when they vest into the DB part of the plan. This is because only teacher (but not employer) contributions are deposited to the DC account, while employer contributions go only to the DB portion of the plan.

To illustrate exactly how this works, consider the hybrid plan for teachers in Indianapolis Public Schools. Teachers must contribute 3 percent of their earnings, all which is deposited into their DC account (in Indiana, called the Annuity Savings Account).[46] The 3 percent savings rate is significantly lower than what financial economists recommend for plans that participate in Social Security (which Indiana's does). The employer contributes 7.5 percent to the DB portion of the plan (the Teacher Retirement Fund) and is not required to contribute anything to their employees' DC account.[47] Teachers vest in their DB benefits after ten years; since the DC account contains only a teacher's own contributions, the value of the DC account (teacher contributions plus investment earnings) is always a component of the total retirement benefits at any point.

Figure 6 depicts the value of an Indianapolis teacher's retirement benefits. For a hybrid plan, the total benefit (green line) equals the sum of the DB (blue) and DC (yellow) benefits. Note that the value of her DC benefits is the same as the value of her own contributions, since her DC account contains no employer contributions. The crossover point here is where the green line (benefits) is above the yellow (equivalent to contributions).

FIGURE 6: The total retirement benefit for a new teacher in Indianapolis Public Schools combines pension wealth and the balance of her retirement account. She must remain in the system ten years before her contributions are worth more than her total benefit.



NOTE: Calculations assume a 6.75 percent rate of return (the system's own assumption) and 2.5 percent inflation. Contributions grow by 6.75 percent. Calculations are based on a female teacher first hired in FY13 with an entry age of twenty-five. The yellow represents both the teacher's cumulative contributions and the balance of her DC account.

During her first nine years she is not eligible to receive a pension, meaning that she accrues zero pension wealth during this time. During this time, the green line therefore reflects only the value of her personal retirement account over this period, which equals her contributions (yellow line). After her ninth year, she has contributed $13,031 to the retirement system. Because pension wealth is zero at this point, the value of her total retirement benefit is simply the balance of her DC account, or $13,031.

After her tenth year, she vests into the DB portion of her benefits, which she will begin to receive once she is eligible to retire (recall that she is always eligible to receive the balance of her DC account). At this point, her expected pension wealth is $6,647 (blue line). The value of her cumulative contributions is now $15,050 (yellow), and her total retirement benefit (pension wealth plus DC account balance) is $21,697 (green; sum of blue and yellow). Because she has vested, her total benefits exceed her cumulative contributions, and she has reached the crossover point.

Although the Indiana plan is a hybrid, it (and others similar to it) behaves much like a traditional DB plan for teachers who leave before vesting, meaning that their benefits consist only of their own contributions plus interest, and they have zero pension wealth. This speaks to the importance of plan design: directing employer contributions to both the DB and DC portions of a hybrid plan is one way to ensure that teachers are not penalized financially for separating from a system earlier in their career. Employer contributions to the plan covering Indianapolis teachers, however, are paid to support only the DB portion of the plan—consequently, those who leave early remain disadvantaged because they do not have access to these funds. (See, for example, the profile of Tennessee's Shelby County School District, which includes Memphis, for a hybrid plan in which employer contributions are distributed over both portions. For a full profile of each district, including plan parameters, please see our *District Profiles* following the *Endnotes*.)

"Directing employer contributions to both the DB and DC portions of a hybrid plan is one way to ensure that teachers are not penalized financially for separating from a system earlier in their career."

SECTION III. IMPLICATIONS

The promise of retirement "benefits" implies a positive return on one's contributions. But the analyses presented here show that in order to receive a positive return, new teachers in many of the nation's largest districts must remain in the system more than twenty years, or in many cases more than thirty years—much longer than the career of the majority of American teachers.[48] The median crossover point is twenty-five years of service for all the districts in this study—a number driven up almost entirely by the thirty-nine traditional DB plans with crossover points that range from thirteen years to infinite. All but one of the six districts with hybrid plans have crossover points between five and ten years. Any teacher who separates from the retirement system before the crossover in any of these districts will incur a *loss* on her contribution to the system when she leaves.

Teachers covered by DC plans, however, have benefits that are immediately worth more than their contributions (the crossover point is, effectively, zero years). These plans offer the greatest portability with no penalties to teachers who do not remain in a retirement system for a full career. However, only six states have a DC plan for teachers. So while many new public school teachers could be better served by offering more and portable options in retirement plans, most don't have any choice. Rather, enrollment in the state system is mandatory, and most states offer only one type of plan, usually a traditional DB. As a result, 89 percent of the nation's teachers work under a DB plan while only 9 percent participate in a DC.[49]

Granted, in all but three of the districts we analyzed, teachers who do remain in the system for decades will eventually reach a crossover point—with teachers in Anoka-Hennepin (MN), Chicago (IL), and Boston (MA) as the exceptions. But many teachers do not stay nearly long enough to reach normal retirement eligibility.[50] This raises the question of fairness of public retirement plans—traditional DB plans in particular—and even some hybrid plans which function like them.

Making this even more inequitable is that, in many of these systems, teachers who exit early are helping to subsidize the benefits of retirees and those who stay in the system long enough to reach the crossover point. The reality is that employer costs for funding pensions have been increasing for some time now, largely driven by growing costs to pay down unfunded liabilities.[51] In Nevada, for instance, the share of district pension contributions devoted to amortizing the retirement system's unfunded liabilities nearly doubled between FY02 and FY14, from 40 percent to 74 percent.[52] To handle this, many states have enacted policies that push the crossover point out so late in a new teacher's career that, despite the seeming "security" of a

pension, she may actually be exposed to increased risk of bearing the burden of paying off a system's unfunded liabilities and subsidizing retirement payments for retirees and incumbents. A team of researchers from the University of Missouri, University of Washington, and the American Institutes for Research demonstrate that "on average across state plans, over 10 percent of current teachers' earnings are being set aside to pay for previously accrued pension liabilities."[53]

Providing a secure retirement for all public school teachers is a worthwhile policy objective—regardless of an individual teacher's tenure or life circumstances. This is implied by providing at least a positive return on contributions for all teachers. Fortunately, several policy options could improve the retirement position for new teachers who ultimately move to a different state, or leave teaching, after a few years or even longer. These actions neither penalize teachers who stay longer nor do they jeopardize the retirement savings of teachers currently in their systems. At the same time, they attract new teachers, and provide them with positive and portable retirement benefits whenever they choose to leave.

First, states offering only a traditional DB plan could add a portable account-based plan, such as a DC plan (therefore not deferring compensation for new teachers), and allow teachers to choose which plan is best for their needs and circumstances. Benefits would be tied directly to contributions and teachers would have access to employer contributions in addition to their own. Moreover, this would afford all teachers an opportunity to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences. As with most things, one size does not fit all teachers' circumstances and retirement needs. A handful of states already offer options—Florida, Michigan, Ohio, South Carolina, Utah, and Washington—and prospective new teachers would be well served if other states followed suit.[54]

Some keepers of the status quo argue that DB plans are designed to retain effective workers by deferring compensation from the short term to the long term. They argue that a DC plan would increase teacher turnover, and therefore decrease average workforce quality.[55] But some empirical evidence suggests a tenuous relationship, at best, between pension benefits and teacher quality.[56] Research examining the link between pension benefits and tenure appears mixed. Some evidence suggests that a weak relationship exists between benefit enhancements and teacher retention.[57] Additional research finds that switching to a more portable plan generated no change in retention in Washington.[58] Other evidence suggests that pension generosity alone does not incentivize longer tenure among Oregon's teacher workforce—teachers are more responsive to incentives when they receive information about the value of their benefits.[59]

Second, states with multiple options should make the more portable option the default. Research suggests that defaults are powerful, especially for a topic about which recent college graduates likely have little experience.[60] And, since DB plans are the default in all states that offer choices, it's no surprise that only 34 percent of teachers who *can* choose a DC plan do so.[61] Yet, given the high turnover rate among new teachers, few will stay long enough to realize the benefits of a DB plan. Far better that new hires be automatically enrolled in a portable plan and opt for the DB plan only if they are certain that they will stay in the system for a very long time.[62]

Finally, states could reduce benefit levels and increase wages. A district can't retain high-quality teachers if it doesn't attract them in the first place. Deferring compensation under a traditional pension means that starting salaries are lower on balance, and research shows that potential new teachers value salary when deciding whether to become an educator.[63] Teachers also probably don't find pensions particularly alluring since the current generation of potential teachers (and really, the current generation of college graduates) is much more mobile than previous generations. So a traditional DB plan not only does nothing to retain current teachers, but also could dissuade potential teachers from entering the profession.

Despite having pension plans in place that are presumably there to retain teachers, most leave the system before serving a full career. As a result, a large group of teachers are underserved by today's retirement systems. If we are dedicated to investing in our teaching workforce, this is simply unacceptable.

APPENDIX A:
DEFINITIONS AND REVIEW OF THE RESEARCH

This section defines and describes the three major types of retirement plans for public school teachers—defined benefit, defined contribution, and hybrid plans. It also reviews the existing research on teacher retirement, including how retirement systems impact the teaching workforce.

DEFINED BENEFIT PLANS

Historically, public pension plans were designed to attract workers, incentivize them to stay, and reward them for doing so. Unlike a private retirement account, a pension is a low-risk, potentially high-reward plan that makes sense for a relatively stable, non-mobile workforce.[64] Different sectors of firms and workers tend to favor certain plan types,[68] and workers time their retirement in response to financial incentives embedded in their plans.[66] Throughout the 1970s, traditional pensions were the most common type offered to public and private sector employees, and they remain the predominant plan for public sector employees. Of all the workers in state pension plans, the public school teachers nationwide are by far the largest group: Over three million of them are enrolled.[67]

Traditional pensions are generally known as **defined benefit plans (DB)**, meaning that their *benefits* are (a) predetermined as soon as a teacher begins employment, and (b) independent of how much is contributed into the system by the teacher.

Teachers enrolled in a pension plan begin contributing a percentage of their salary to the pension fund the day they receive their first paycheck (**employee contribution**). Their school district and/or the state also make an **employer contribution**.[68] Contribution rates are usually determined by state law. Upon reaching retirement **eligibility**—a condition usually determined by some combination of the teacher's age and how many years of service she has—the teacher may retire from service and begin receiving a predetermined amount of money at regular intervals (usually monthly or yearly) for the rest of her life. The amount of the payment depends on how long she stays in the system, some final average of her salary, and a **multiplier** or "accrual factor." The total amount she'll receive over the remainder of her lifetime (**pension wealth**) also depends on her age at retirement and how long she lives (among other things).[69] A teacher's **net pension wealth** is the difference between her pension wealth and her cumulative contributions, and the **crossover point** is when pension wealth is worth more than

contributions (or when net pension wealth becomes positive). The timing of the crossover point depends on a variety of factors, including the vesting period, the employee contribution rates, the multiplier, and a teacher's salary in the years before she retires.

In order to receive retirement benefits, teachers must be **vested** in the system—meaning that they have stayed in the system long enough that they are eligible for a pension once they leave. If a teacher leaves before vesting, she receives only a **refund** of her own contributions, which may or may not also include what her employer contributed on her behalf, and possibly interest.[70, 71] Only a few DB plans in this study refund any portion of the employer contributions.[72]

Vested teachers who leave a retirement system before becoming eligible to retire face a choice: They can leave their contributions in the pension fund and wait to receive benefits when they reach retirement age (a deferred pension), or they can choose to receive a refund right away.

Because DB plans are administered by state-wide systems that usually do not have reciprocity across state lines, teachers have financial incentives to stay: Once a teacher leaves the system, she can't transfer her benefits to another system in another state. Some cover all public sector workers in the state, and some cover only teachers in the state (meaning a teacher could switch districts, but not change jobs completely, and still keep her benefits). And a few systems cover teachers in a single district only.

Defined benefit plans are also notoriously "backloaded," meaning that benefits accrue very slowly at the beginning of a teacher's career and pick up pace further along. Some view backloading as a feature; others regard it as an obstacle to a secure retirement for mobile and young teachers.[73] Typically, benefits accrue rapidly after a teacher reaches her fifties. Because of the backloaded nature of DB plans, workers who separate from a pension system before reaching retirement eligibility (regardless of circumstance) will collect a substantially lower level of benefits than if they remain in the system for an entire career. The uneven accrual of benefits under these plans also fosters late crossover points. That is, during the beginning of their careers, teachers under these plans will typically contribute more than they would accrue in pension wealth.

So while DB plans are designed to incentivize and reward workers who remain in a system for a full career, the combination of late crossover points, backloaded benefits, and the lack of portability means that most DB plans also impose potentially large mobility costs on teachers who leave early.[74]

DEFINED CONTRIBUTION PLANS

While DB plans cover most public sector workers, a 401(k)-type plan is by far the most prevalent plan in the private sector.[75] They are also a relatively new development—up until a few decades ago, many employers offered them as supplements to (but not replacements for) a traditional DB pension. Only after the passage of federal legislation and modifications to the tax code in the 1970s did they become as common as they are today.[76]

A 401(k) is a specific type of a **defined contribution plan (DC)**. Under a DC plan, *contributions* are (a) predetermined as soon as a teacher begins employment, and (b) directly related to benefits received upon retirement.

More specifically, retirement benefits are defined not by a predetermined formula (as they are in a DB plan), but by contributions to a retirement savings account made by both the employee and employer, plus investment earnings. Teachers vest immediately in their own contributions and earnings. Some DC plans allow immediate vesting in employer contributions as well, while in others teachers vest in their employer accounts in a stepwise manner (e.g., 50 percent of the amount after two years of service, 75 percent after three years, and the entire amount after four years).

Under a DC plan, the teacher owns the account and may have the option of directing its investments. There is no retirement age or years of service that determine when she can receive benefits. Rather, at any point she can withdraw the entire content of her DC account as a lump sum (less taxes, should she leave early). She can also roll it over into another retirement account. The account balance can also usually be converted to an annuity (i.e., periodic payments made for a specified period of time). So, teachers are able to claim the entire account (employee plus employer portions) within a reasonably short period.[77] By definition, DC plans have a crossover point of zero years; new teachers reach it immediately.

HYBRID PLANS

Hybrid plans merge DB and DC plans. Retirement benefits are the sum of the pension benefit from the DB component, and the value of the DC account. Although the details vary from plan to plan, usually the employee contributes to the DC account, while the employer contributes to the DB plan (but in some cases, the contributions of both are divided across the two components instead). Teachers typically vest immediately in the DC account, while there is a vesting period for the DB benefit. Again, there is some variation in this structure. Whether or not there is a crossover point, and when it occurs, is determined by the terms of the plan. Hybrid plans have both the positive and negative aspects of the other plan types, although to a lesser degree than DB or DC plans have on their own. The DC component gives members of hybrid plans some degree of portability, because teachers vest into at last some of their benefits right away. But the DB component means hybrid benefits are not completely portable like DC-only plans.

A BRIEF REVIEW OF THE RESEARCH

Seminal work by Costrell and Podgursky demonstrates the mechanics of teacher DB plans and how pension wealth grows over time.[78] They show that these plans are typically backloaded, meaning that benefits accrue very slowly in the beginning of a teacher's career and ramp up rapidly in the latter years. Thus, teachers who exit the retirement system early are disadvantaged compared to teachers who remain under the same system much longer. A teacher faces an incentive to remain in the classroom regardless of her effectiveness, life circumstances, or desire to stay if the retirement benefit she would accrue for remaining another year is greater than the wages she would give up if she retired. She might also wait until a career milestone that sharply increases retirement benefits in comparison to her wages and leave immediately thereafter. Further, there is usually a point after which pension wealth accrual becomes negative; staying longer levies a "cost" on teachers who remain on the job, regardless of whether they have good years left to devote to educating students.

In another study, Costrell and Podgursky document instances in which these systems impose large capital losses on young and mobile teachers who leave a system before reaching retirement eligibility.[79] Teachers who work fifteen years under one pension system, then fifteen years under another, stand to lose over half of the pension wealth they would have accrued working for thirty years under one system—a loss that can amount to several hundred thousand dollars in pension wealth. Years of service in one system does not transfer to retirement benefits under another system. Consequently, these plans create "pension borders" between states (and occasionally within them), which reduce labor market efficiency.[80]

A recent report from Bellwether Education Partners and the Urban Institute finds that new teachers are penalized, sometimes drastically, for leaving before reaching early or normal retirement eligibility.[81] Another finds that while benefit increases apply to all teachers, benefit decreases typically apply only to new teachers.[82] Studies also show that retirement costs negatively impact teacher compensation and, absent reform, will constitute a growing share of per-pupil expenditures.[83] A report using Oregon data finds that high "legacy" retirement costs are ultimately associated with high turnover rates, perhaps because paying legacy costs means fewer dollars for salaries.[84]

Teacher behavior reflects the costs that traditional DB plans impose. When given the option to choose between a DB plan and DC plan, about 30 percent of teachers in Florida chose to enroll in DC plans.[85] Notably, young teachers who selected the DC plan were more likely to leave the system than teachers in the DB plan; the DC plan gave them flexibility, while the DB plan seemed to lock them in.

Another study examined the retirement behavior of Missouri teachers, who must enroll in a DB plan. The authors simulated the effects of a DC option and found that it would increase the retention rate of new teachers while also eliminating the penalty veterans face if they work past the year their DB pension wealth peaks.[86]

Teachers seem to prefer flexibility: In 1995, teachers in Washington enrolled in the DB plan were given the choice to transfer to a hybrid plan. In one cohort under study, 75 percent switched to the hybrid.[87] Some have argued that, despite teacher preferences, traditional DB plans should remain because they are more cost effective than DC plans.[88] But recent empirical evidence calls these claims into question, arguing that DC plans can deliver retirement in a cost-effective manner on par with traditional DB plans.[89] Ultimately, it seems that much of the argument against switching to defined contribution or hybrid plans is more political than economic.

APPENDIX B: FORMAL METHODOLOGY

Our analysis is based on parameters and rules for each retirement system that covers teachers in each district we study. For state-level plans, we drew directly from plan documents and on data collected by the National Council on Teacher Quality (NCTQ).[90] For local plans, we obtained the requisite information from plan handbooks available to members on each system's website. The information we used is based on the plan that covers newly hired teachers.

For a defined benefit (DB) plan, an individual *i's* retirement benefit is defined by the following formula:

$$Ben_i = \gamma \times YOS_i \times FAS_i$$

where γ is an accrual rate, *YOS* (Years of Service) is the number of creditable years of service, and *FAS* (Final Average Salary) is the average salary in the final few years of her career (the exact number of years is defined by plan parameters, and typically ranges from three to five). The product of γ and *YOS* is commonly referred to as the replacement rate and represents the percent of a teacher's pre-retirement income she receives after retirement. For example, the annuity for a teacher who retires after thirty years of service, exits with *FAS* of $50,000, and works in a state that provides 2.0 percent of her *FAS* per year is:

(0.02 per year) × ($50,000) × (30 years) = $30,000 per year

payable for life starting at her eligible retirement age. The replacement rate is 60 percent, meaning that this teacher's benefit will replace 60 percent of her *FAS*. Many states add a cost-of-living adjustment on top of the employer's base pension benefit.

To determine the timing of the crossover point, we rely on two measures: pension wealth (*PW*) and cumulative contributions (*CC*). Each is computed at every year over a career at which a teacher might separate. We formalize the two as follows.

Pension wealth is employed widely in the teacher pension literature and gives the present value of the stream of a teacher's annuity payments discounted for survival probabilities.[91] Discounting the stream of future payments back to the point of separation allows comparability between the values of both pension wealth and cumulative contributions at a single point. Pension wealth is defined by:

$$PW(S) = \sum_{R \geq S} \frac{Ben(R|S) \cdot Surv(R|S)}{(1+r)^{(R-S)}}$$

where *Ben(R|S)* is the value of the annuity, collectible at age *R* and conditional upon separating at age *S*. In other words, the pension wealth for a teacher eligible for an annuity at age *R*, who separates from service at age *S*, is the sum of the stream of annuity payments, weighted by conditional survival probabilities, *Surv(R|S)*, and discounted back to the present at rate *r*.

For a teacher separating at year *t* after *T* years of service, the amount a teacher cumulatively contributes to the pension fund up to *T* years of service is simply the sum of products of each year's observed salary ($salary_t$) and the contribution rate (c_t), grown by the system's own assumption about the rate of return on investments (*ror*):

$$CC_T = \sum_{t=1}^{T} (c_t)(salary_t)(ror)$$

The crossover point occurs when $PW_T = CC_T$. Calculations are based on each plan's own assumptions about the rate of return on investments and uses these rates as a measure of the opportunity cost for contributions made to each pension fund. We assume inflation at 2.5 percent.

Finally, we make our calculations for a representative teacher—namely a female teacher who begins teaching at age twenty-five. We use each district's own teacher salary schedules and draw survival probabilities from the Center for Disease Control's *Life Tables*.[92]

APPENDIX C:
CROSSOVER POINTS UNDER DIFFERENT DISCOUNT RATES

We used each plan's own assumptions about the rate of return to compute the present value of benefits when estimating the crossover points. Not only do these assumptions vary from plan to plan, but financial economists also argue that they tend to understate the risk taken on by the plans themselves. Below, we estimate the crossover points for a range of discount rates. With few exceptions, that point occurs well after a decade of teaching. Even with the lower discount rate, it will take more than two decades until a typical new teacher's retirement benefit is worth more than her cumulative contributions. (See Tables C-1 and C-2.)

TABLE C-1: Crossover points (in years) under alternative discount rates of 6.5 percent, 8.0 percent, and 9.5 percent

State	District	6.5 percent	8.0 percent	9.5 percent
Alabama	Mobile County Public School System	23	33	Infinite
Alaska	Anchorage School District	0	0	0
Arizona	Mesa Public Schools	30	30	Infinite
Arkansas	Little Rock School District	8	19	25
California	Los Angeles Unified School District	25	36	Infinite
Colorado	Jeffco Public Schools	20	22	25
Connecticut	Hartford Public Schools	16	22	30
Delaware	Christina School District	15	19	25
District of Columbia	District of Columbia Public Schools	20	27	30
Florida	Miami-Dade County Public Schools	0	0	0
Georgia	Gwinnett County Public Schools **	13	23	26
Hawaii	Hawaii State Department of Education	30	32	Infinite

** Estimates based on DB plan only, does not include supplemental plan

CONTINUED...

TABLE C-1: Crossover points under alternative discount rates of 6.5 percent, 8.0 percent, and 9.5 percent.

State	District	6.5 percent	8.0 percent	9.5 percent
Idaho	West Ada School District	16	26	29
Illinois	Chicago Public Schools	36	Infinite	Infinite
Indiana	Indianapolis Public Schools	2	10	10
Iowa	Des Moines Public Schools	23	29	31
Kansas	Wichita Public Schools	29	30	Infinite
Kentucky	Jefferson County Public Schools	25	27	27
Louisiana	Jefferson Parish Public School System	20	29	Infinite
Maine	Portland Public Schools	25	35	Infinite
Maryland	Montgomery County Public Schools	27	30	Infinite
Massachusetts	Boston Public Schools	37	Infinite	Infinite
Michigan	Detroit Public Schools Community District	0	0	0
Minnesota	Anoka-Hennepin School District	23	Infinite	Infinite
Mississippi	DeSoto County School District	12	18	29
Missouri	Springfield Public Schools	23	26	Infinite
Montana	Billings Public Schools	19	29	Infinite
Nebraska	Omaha Public School District	22	27	Infinite
Nevada	Clark County School District	28	30	Infinite
New Hampshire	Manchester School District	30	Infinite	Infinite
New Jersey	Newark Public Schools	15	19	Infinite
New Mexico	Albuquerque Public Schools	28	30	Infinite
New York	New York City Department of Education	18	24	32
North Carolina	Wake County Public School System	18	24	25
North Dakota	Bismarck Public School District	29	35	Infinite

CONTINUED...

TABLE C-1: Crossover points under alternative discount rates of 6.5 percent, 8.0 percent, and 9.5 percent.

State	District	6.5 percent	8.0 percent	9.5 percent
Ohio	Columbus City Schools	0	0	0
Oklahoma	Oklahoma City Public Schools	21	30	Infinite
Oregon	Portland Public Schools	5	5	5
Pennsylvania	The School District of Philadelphia	25	30	Infinite
Rhode Island	Providence Public School District	4	13	24
South Carolina	Greenville County Schools	0	0	0
South Dakota	Sioux Falls School District	18	24	29
Tennessee	Shelby County Schools	5	5	5
Texas	Houston Independent School District	18	26	35
Utah	Alpine School District	0	0	0
Vermont	Burlington School District	21	28	31
Virginia	Fairfax County Public Schools	20	26	30
Washington	Seattle Public Schools	10	10	10
West Virginia	Kanawha County Schools	18	27	30
Wisconsin	Milwaukee Public Schools	21	28	Infinite
Wyoming	Laramie County School District	23	27	29

TABLE C-2: Median crossover points under different discount rates, by plan type.

Plan type	6.5 percent	8.0 percent	9.5 percent
All plans	20	27	31
DB plans	22	28	Infinite
DC plans	0	0	0
Hybrid plans	5	10	10

ENDNOTES

1. J. DiStefano, "Pa. taxpayers will pay $4 billion+ to fund school pensions next year," *Philadelphia Inquirer*, December 9, 2015, http://www.philly.com/philly/blogs/inq-phillydeals/Pensions-boost-surcharge-on-Pa-public-school-payrolls-to-30-.html. S. Esack, "Pension reform bill fails in PA Legislature," *Morning Call* (Allentown, PA), December 16, 2016, http://www.mcall.com/news/nationworld/pennsylvania/mc-pa-final-pension-reform-vote-20161026-story.html.

2. J. Hohman, "Forgive Detroit Public Schools pension debt," *Detroit News* (Detroit, MI), May, 24, 2016, http://www.detroitnews.com/story/opinion/2016/05/24/forgive-detroit-public-schools-pension-debt/84891124/; C. Livengood, "Feds: DPS keeps $30M in aid meant for pensions," *Detroit News* (Detroit, MI), April 26, 2016, http://www.detroitnews.com/story/news/local/detroit-city/2016/04/25/dps-keeps-federal-aid-meant-pensions/83527114/.

3. M. Blau and B. Kirkos, "Chicago teachers avoid strike after reaching new deal," *CNN.com*, last modified October 11, 2016, http://www.cnn.com/2016/10/11/us/chicago-teachers-strike-avoided/.

4. We are referring only to the teacher's own contribution on the input side. The district's contribution is part of the *output*—at least for DC plans, where the benefit depends on the contribution. Our estimate relates to the input and output from the perspective of the *teacher*.

5. For a representative teacher in defined benefit plans, the study calculates "pension wealth," or the total expected value of a teacher's stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy conditional on the age of separation. For teachers in defined contribution plans, benefits are equivalent to the value of a teacher's retirement account: her and her employer's contributions, plus any gains or losses from investment performance over time. Hybrids combine the two.

6. Three in four is likely an underestimate since that figure does not include teachers who switch districts or switch states and continue to teach. See J. McGee, Defined Contribution Pensions Are Effective (New York City, NY: Manhattan Institute, 2015), http://www.manhattan-institute.org/pdf/cr_100.pdf.

7. B. Backes et al., Benefit or Burden? On the Intergenerational Inequity of Teacher Pension Plans, No. 1517 (Washington, D.C.: National Center for Analysis of Longitudinal Data in Education Research (CALDER), 2015), http://www.caldercenter.org/sites/default/files/WP%20148_0.pdf.

8. M. Podgursky and S. Ni, How Teachers Respond to Pension System Incentives: New Estimates and Policy Applications (Columbia, MO: University of Missouri, August 2015), https://faculty.missouri.edu/~podgurskym/wp-content/uploads/2015/08/stock-wise-pension-rules-final.pdf.

9. Seventeen percent: L. Gray et al., *Public School Teacher Attrition and Mobility in the First Five Years: Results From the First Through Fifth Waves of the 2007–08 Beginning Teacher Longitudinal Study* (Washington, D.C.: National Center for Education Statistics, April 2015), http://nces.ed.gov/pubs2015/2015337.pdf; most leave by twenty years: J. McGee, *Defined Contribution Pensions are Cost-Effective* (Washington, D.C.: Manhattan Institute, August 2015), http://www.manhattan-institute.org/pdf/cr_100.pdf and C. Aldeman and A. Rotherham, *Friends without Benefits: How States Systematically Shortchange Teachers' Retirement and Threaten Their Retirement Security* (Sudbury, MA: Bellwether Education Partners, Inc., March 2014), http://bellwethereducation.org/sites/default/files/BW_PensionPaper_031314.pdf. In some states, attrition is even higher—32 percent of teachers in Illinois who started in 2001 left teaching in the state within five years and have not come back (and, contrary to popular belief, attrition rates weren't substantially different for suburban or higher-income schools). See K. DeAngelis and J. Presley, "Leaving Schools or Leaving the Profession: Setting Illinois' Record Straight on New Teacher Attrition" (Edwardsville, IL: Illinois Education Research Council, 2007), http://files.eric.ed.gov/fulltext/ED497703.pdf.

10. S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce: Findings from The Condition of Education 2005* (Washington, D.C.: NCES, June 2005), http://nces.ed.gov/pubs2005/2005114.pdf; while no recent data exist, NCES also reports that the average experience of the 2011–12 teaching workforce is approximately fourteen years. See NCES, "Table 3: Percentage distribution of public school teachers based on years of teaching experience, average total years of teaching experience, percentage distribution of teachers based on years teaching at current school, and average years teaching at current school, by state: 2011–12," https://nces.ed.gov/surveys/sass/tables/sass1112_2013314_t1s_003.asp.

11. In this example and throughout the analysis in this report, we use the term "contributions" to mean the value of a teacher's contributions—the amount of her employee contribution, grown by each system's assumed rate of return. This example is based on Gwinnett County (GA) and Jefferson Parish (LA) salary schedules, with 2.5 percent inflation. It assumes no cost-of-living adjustments. It takes into account survival probabilities and the time value of money by using the system's assumed rate of return on investments (7.5 percent for Georgia and 8.0 percent for Louisiana). Gwinnett County teachers' retirement benefits are based on two plans: the state plan (Georgia TRS) and the Gwinnett Retirement System. The latter is a supplemental plan meant to replace Social Security with a somewhat more generous benefit.

12. Amy would be better off if she instead placed her own contributions in a retirement account that credited 5 percent interest compounded (not an unrealistic return on investment and much more conservative than what the systems assume). After twenty years, this account would be worth $92,000.

13. These calculations assume a modest annual rate of 5 percent.

14. K. M. Doherty et al., *Doing the Math on Teacher Pensions: How to Protect Teachers and Taxpayers* (Washington, D.C.: National Council on Teacher Quality, January 2015), http://www.nctq.org/dmsView/Doing_the_Math. The estimate of $500 billion is based on each plan's own assumptions for the rate of return. The median assumed rate of return for public teacher covered state pension plans is 7.75 percent. McGee (2015) estimates the pension debt for all state and local plans for public employees at between one trillion and six trillion dollars. Financial economists argue that lower rates better reflect the risk to taxpayers. See, for example: B. M. Waring, *A Pension Rosetta Stone: Reconciling Actuarial Science and Pension Accounting with Economic Values*; prepared for the Public Pension Finance Symposium, hosted by the Society of Actuaries, May 2009. A lower assumed rate implies a larger level of pension debt.

15. Doherty et al. (2015). The number of states with ten-year vesting periods increased from nine states in 2009 to fifteen states in 2014.

16. "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return. The crossover point is not the same as retirement age. The former is the number of years a teacher must work in order for her total expected pension benefits to exceed her total contributions; if she separates from the system before the crossover point, the pension benefits accrued up to that point are worth less than her total contributions up to that point. If she separates after the crossover point, her pension benefit (measured as pension wealth) is worth more than her cumulative contributions. The retirement age is the age at which a teacher becomes eligible to receive the pension payment guaranteed by the plan.

17. For DB plans, the analysis does not factor in refunds: for simplicity, we define benefits as pension wealth as opposed to the greater of pension and refund benefits.

18. Our analysis employs the same methods for computing pension wealth used by R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and Their Consequences for School Staffing," *Education Finance and Policy 4*, no. 2 (2009), 175–211. Pension benefits are measured as lifetime expected pension wealth, which we describe later in the paper and in *Appendix B*. It is an expected value (not actual value). Depending on how long a teacher lives, the total amount she receives while in retirement may fall short of or exceed this amount.

19. Teachers in thirty-five of the districts enroll in Social Security while the other sixteen do not; the system (not the teacher) determines which is the case. This additional source of retirement income presents a potential endogeneity problem in which pension rules are partly determined by whether covered employees also enroll in Social Security. Because it is a second source of retirement income, plans that also subscribe to Social Security tend to offer lower levels of retirement benefits than plans not enrolled in Social Security.

20. We assume that the opportunity costs for teacher contributions are the same as the retirement system's assumption for return on investment.

21. To the extent that a district "picks up" all or part of a teacher's contribution (i.e., makes the employee contribution on the teacher's behalf), the crossover point will come earlier. A few districts, such as Chicago Public Schools, pick up their teachers' contributions. Milwaukee Public Schools picked up teachers' contributions until the enactment of Act 10 in 2011, which eliminated this practice. For simplicity, we ignore district pickups in the analysis and assume that teachers make the full employee contributions according to statute.

22. NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22; some plan parameters from the NCTQ database were independently verified using plan documents and/or the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

23. For example, some districts specify longevity payments in the contract instead of in the salary schedule.

24. According to the *Beginning Teacher Longitudinal Study*, 80 percent of beginning teachers had a bachelor's degree. NCES, "Meet the Cohort," *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, it seems reasonable to assume that a teacher who remains five years will have a master's degree by that point.

25. E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

26. Large urban districts tend to experience greater teacher turnover than others (see, for example, T. Carroll, *The High Cost of Teacher Turnover* (Washington, D.C.: National Commission on Teaching and America's Future, 2007), http://nctaf.org/wp-content/uploads/2012/01/NCTAF-Cost-of-Teacher-Turnover-2007-policy-brief.pdf). Therefore, our selection strategy is especially important to understanding how pension plans affect teachers who are more likely to leave a pension system before reaching retirement eligibility.

27. C. Aldeman and R. Johnson, *Negative Returns: How State Pensions Shortchange Teachers* (Sudbury, MA and Washington, D.C.: Bellwether Education Partners and Urban Institute, September 2015), http://www.teacherpensions.org/resource/negative-returns-how-state-pensions-shortchange-teachers.

28. Teachers in Chicago (IL), Gwinnett County (GA), Omaha (NE), New York City (NY), and Fairfax County (VA) are covered by municipal plans.

29. W. Fornia and N. Rhee, *Are California Teachers Better Off with a Pension or a 401(k)?* (Berkeley, CA: UC Berkeley Center for Labor Research and Education, February 2016), http://laborcenter.berkeley.edu/pdf/2016/California_Teachers_Pension_401k.pdf. Fornia and Rhee use a state-level approach and find a crossover point of thirty-one years for California teachers, which is identical to our finding for Los Angeles.

30. Kansas teachers hired on or after July 1, 2009 and before January 1, 2015 belong to School Tier 2—a defined benefit plan—which is the plan analyzed in this report as all results are based on retirement plan rules as they apply to new hires who began in FY13. Kansas teachers hired on or after January 1, 2015 belong to School Tier 3, a cash balance plan.

31. 72 percent of teachers will leave before twenty years of service: J. McGee, *Defined Contribution Pensions are Cost-Effective* (Washington, D.C.: Manhattan Institute, 2015), https://www.manhattan-institute.org/html/defined-contribution-pensions-are-cost-effective-6361.html.

32. The pension plan covering teachers in Anoka-Hennepin School District (MN) provides a unique feature designed to protect against inflation during times that employees exit the system. If a teacher exits the system—for whatever reason—and chooses to defer her retirement benefit instead of collecting a refund on her contributions, then the system will provide deferral increases in which her benefit will increase 2 percent per year during the period from when she leaves the system until she becomes eligible to begin collecting an annuity. This plan is the only public plan for teachers with this feature. Despite this layer of protection, however, teachers still don't ever reach the crossover point.

33. Illinois added a new tier to its public pension plans in 2010, including the plan for Chicago Public Schools (CPS) teachers, which changed many of the plans' parameters and dramatically reduced pension benefits for public employees hired on or after January 1, 2011. (While CPS teachers participate in their own pension system, separate from the state fund, both follow the same tier structure.)

34. This is likely a combination of low benefit accrual and high employee contribution rates. Benefit accrual for teachers in these plans is comparatively low because normal retirement eligibility rules are based solely on age (sixty-seven for Illinois, sixty-six for Minnesota, and sixty for Massachusetts). Employee contribution rates for Illinois and Massachusetts teachers are particularly high (9 percent and 11 percent, respectively).

35. Teachers cannot opt out of the public retirement system altogether. If their state only has a defined benefit plan, they must participate. If they work in one of only three states that have a DB plan and an alternative, they can choose the alternative plan instead (in addition to a DB plan, Florida also has a DC plan, Washington has a hybrid, and Ohio offers both).

36. Three other districts—Detroit, Columbus, and Alpine—have a hybrid option, but these districts also have a DC option. In this case, we report the DC plan since it is the most portable option. See *Section I* for more.

37. Retirement plans that subscribe to Social Security may have different parameters that in turn impact the crossover point—the idea being that Social Security is an additional source of retirement income for teachers. For instance, employee contribution rates to the pension fund tend to be higher if they do not contribute to Social Security. The correlation between the timing of the crossover point and whether a retirement plan also enrolls teachers in Social Security is weakly negative and not significant (the Pearson's correlation coefficient is -0.11, p=0.46). The result is very similar if only DB plans are included in the sample.

38. J.D. Rauh, *Hidden Debt, Hidden Deficits: How Pension Promises are Consuming State and Local Budgets* (Stanford, CA: Hoover Institution, April 2016), http://www.hoover.org/research/hidden-debt-hidden-deficits-how-pension-promises-are-consuming-state-and-local-budgets. A higher discount rate implies less pension wealth because pension wealth equals promised future benefits discounted to their "present value." Present value conveys that $100 today is worth less than $100 in the future, and the number of dollars required to generate $100 in the future depends on the discount rate. The higher the discount rate, the fewer dollars required, and vice versa.

39. B. Backes et al., *Benefit or Burden? On the Intergenerational Inequity of Teacher Pension Plans*, No. 1517 (Washington, D.C.: National Center for Analysis of Longitudinal Data in Education Research (CALDER), 2015), http://www.caldercenter.org/sites/default/files/WP%20148_0.pdf and Teachers' Retirement System of the State of Illinois, *Actuarial Valuation Report: June 30, 2014 Actuarial Valuation of Pension Benefits*, January 2015, http://trs.illinois.gov/pubs/actuarial/2014ValuationRept.pdf.

40. Jeffco's salary schedule is one of many examples of a non-linear pay scale. Unusually, its salary schedule is actually front-loaded, with annual raises of between 4 percent and 5 percent occurring between one year and eleven years of service, no raises between years twelve and fifteen, a 7.5 percent raise after year fifteen, and annual raises of approximately 1 percent between years sixteen and twenty-five.

41. At any point, a teacher may opt for a refund of her own contributions, which may or may not also include what her employer contributed on her behalf, and possibly interest (details vary by plan). Only a few DB plans under study will refund any portion of the employer contributions. See *Appendix A* for more.

42. Teachers in Hawaii also enroll in a retirement plan that provides a modest measure of portability. Teachers who are vested and opt for a refund may receive 20 percent of the employer contributions, in addition to their own contributions (8 percent of earnings each period). For our representative teacher, the level of pension wealth is less than a refund benefit until her twenty-sixth year teaching. Although the additional 20 percent of employer contributions is generous relative to most public DB plans, it only modestly offsets the large opportunity costs for teachers.

43. This point represents the time at which her opportunity cost for contributions (set to the system's own assumed rate of return on investments) exceeds interest credited to claimants' refunds (0.5 percent).

44. For simplicity, we assume a constant (5 percent) rate of return—in reality, investment earnings will fluctuate periodically, and the line will not proceed as smoothly as depicted. The observed line would mirror a cash balance plan that credits accounts at 5 percent.

45. For comparison, the estimated crossover point of the old statewide defined benefit plan is twenty years. Aldeman and Johnson, *Negative Returns*. http://www.teacherpensions.org/sites/default/files/TeacherPensions_Negative%20Returns_Final.pdf.

46. Teachers may opt to contribute up to 10 percent.

47. Employers may pick up the 3 percent employee contribution, but this is optional (INTRF Handbook, 35).

48. National Center for Education Statistics, Table 209.10: "Number and Percentage Distribution of Teachers in Public and Private Elementary and Secondary Schools, by Selected Teacher Characteristics: Selected Years, 1878–88 through 2011–12," Digest of Education Statistics (Washington, D.C.: NCES), http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

49. BLS, *Retirement Benefits: Access, Participation, and Take-up Rates*, "Table 2: State and Local Government Workers, National Compensation Survey," March 2014, http://www.bls.gov/ncs/ebs/benefits/2014/ownership/govt/table02a.htm.

50. C. Aldeman, *Hidden Penalties: How States Shortchange Early-Career Teachers* (Sudbury, MA: Bellwether Education Partners, September 2015), http://www.teacherpensions.org/sites/default/files/TeacherPensions_HiddenPenalties_Final.pdf. Moreover, if a new teacher leaves before the crossover point, the amount that she can claim as a refund may be below general guidelines for judicious retirement savings—and few workers save adequately for retirement on their own. See R. Thaler and S. Bernatzi, "Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving," *Journal of Political Economy*, 112 (S1), 2004).

51. R. Costrell, "School Pension Costs Have Doubled over the Last Decade, Now Top $1,000 Per Pupil Nationally," Teacherpensions.org (blog), July 20, 2015, http://www.teacherpensions.org/blog/school-pension-costs-have-doubled-over-last-decade-now-top-1000-pupil-nationally. Costrell estimated that employer pension costs have doubled over the last ten years.

52. M. Leuken, "How Nevada's Pension Structure is Hurting Teachers, Taxpayers—and What Can Be Done to Fix It," Edchoice.org (blog), May 16, 2016, https://www.edchoice.org/blog/how-nevadas-pension-structure-is-hurting-teachers-taxpayers/.

53. B. Backes et al., *Benefit or Burden?*

54. A related recommendation might be that, should states choose to stick with only their traditional DB plans, they should at least adopt measures that reduce the early-leaver penalties such as those in South Dakota (see *Portability in DB Plans? The Unique Case of South Dakota*). However, because of the myriad other problems associated with DB plans, we do not advocate for this "making the best of a bad situation" fix, lest it seem like we are recommending *only* this action without any other systemic reforms.

55. C. Weller, *Buyer Beware: The Risks to Teacher Effectiveness from Changing Retirement Benefits* (Washington, D.C.: Center for American Progress, 2011), https://www.americanprogress.org/issues/education/reports/2011/09/30/10293/buyer-beware/.

56. R. Costrell and J. McGee, "Teacher Pension Incentives, Retirement Behavior, and Potential for Reform in Arkansas," *Education Finance and Policy* 5, no. 4 (2010), 492–518; C. Koedel et al., "Pension-Induced Rigidities in the Labor Market for School Leaders," Working Paper 67 (Washington, D.C.: CALDER Center, January 2012), 11–15; M. Podgursky, "Is It Time to Rethink Teacher Pensions in Maryland?" (Baltimore, MD: Abell Foundation, November 2006), http://files.eric.ed.gov/fulltext/ED505076.pdf.

57. C. Koedel and P. Xiang, "Pension Enhancement and the Retention of Public Employees: Evidence from Teaching," Working Paper 123 (Washington, D.C.: CALDER Center, October 2015), http://www.caldercenter.org/sites/default/files/WP%20123%20%28Updated%29.pdf. Koedel and Xiang find that enhancements to pension benefits in St. Louis did not generate noticeable differences in teacher retention.

58. D. Goldhaber et al., *Pension Structure and Employee Turnover: Evidence from a Large Public Pension System* (Washington, D.C.: CALDER Center, September 2015), http://www.caldercenter.org/publications/pension-structure-and-employee-turnover-evidence-large-public-pension-system.

59. Cahill et al., *Pension Generosity in Oregon and Its Impact on the K–12 Workforce*, Working Paper 488 (Washington, D.C.: BLS, April 2016), http://www.bls.gov/osmr/pdf/ec160030.pdf.

60. J. Beshears, J.J. Choi, D. Laibson, and B.C. Madrian, "The importance of default options for retirement saving outcomes: Evidence from the United States," in *Social Security Policy in a Changing Environment*, ed. Jeffrey Brown, Jeffrey Liebman, and David A. Wise (Chicago: University of Chicago Press 2009), 167-195, http://www.nber.org/chapters/c4539.pdf. I. Dinner, E. J. Johnson, D.G. Goldstein, and K. Liu, "Partitioning Default Effects: Why People Choose Not to Choose," (2010), https://www0.gsb.columbia.edu/mygsb/faculty/research/pubfiles/5279/partitioning%20default%20effects.pdf.

61. BLS, *Retirement Benefits: Access, Participation, and Take-up Rates.*

62. Critics might argue that the default option should reward teachers who stay longer, and thus the DB plan should be the default. However, research in Washington shows that the hybrid plan provides equal or even greater retirement security compared to the traditional DB plan for a representative teacher, suggesting that a more portable plan is a better option for both short- and long-career teachers. See D. Goldhaber and C. Grout, "Pension Choices and the Savings Patterns of Public School Teachers," *Education Finance and Policy* 11, no. 4 (2016), 449–481.

63. D. Figlio, "Teacher salaries and teacher quality," *Economic Letters* 55, no. 2 (1997): 267-271, http://www.sciencedirect.com/science/article/pii/S0165176597000700. C.F. Manski, "Academic ability, earnings, and the decision to become a teacher: Evidence from the national longitudinal study of the high school class of 1972," in *Public Sector Payrolls*, ed. David A. Wise (Chicago: University of Chicago Press 1987), 291-316, http://www.nber.org/chapters/c7157.pdf.

64. R. Clark et al., *A History of Public Sector Pensions in the United States* (Philadelphia, PA: Wharton School of Business, 2003), http://www.pensionresearchcouncil.org/publications/pdf/0-8122-3714-5-1.pdf; R. Ippolito, *Pension Plans and Employee Performance: Evidence, Analysis, and Policy* (Chicago, IL: University of Chicago Press, 1997).

65. R. Clark and S. Scheiber, "Adopting Cash Balance Pension Plans: Implications and Issues," *Pension Economics and Finance* 3, no. 3 (2004), 271–295.

66. B. Asch et al., "Financial Incentives and Retirement: Evidence from Federal Civil Service Workers," *Journal of Public Economics* 89, no. 2 (2005), 427–440.

67. 3.3 million K–12 teachers total: T. Snyder and S. Dillow, *Digest of Education Statistics 2011* (Washington, D.C.: National Center for Education Statistics, 2012), https://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp; 88 percent are in a pension: BLS, *Retirement Benefits: Access, Participation, and Take-up Rates*, http://www.bls.gov/ncs/ebs/benefits/2014/ownership/govt/table02a.htm.

68. Employer contributions may be made by the school district, the state, or both. For the analysis in this report, it is not necessary to make this distinction.

69. Costrell and Podgursky (2009) explain pension wealth as a measure of the value of one's retirement wealth accrued up to a point in one's career. It uses a particular plan's retirement benefit formula to compute the stream of pension payments, factoring in the time value of money (i.e., a dollar today is not the same as a dollar in the future). It then converts this stream into a lump sum using expected mortality probabilities as weights, discounting the stream back to today's dollars.

70. Whether an individual's refund is adequate depends on one's retirement goals, when an individual began saving, wages, current savings levels, and assumptions about a variety of other factors such as inflation, wage growth, and longevity. A variety of online tools are available for retirement planning—while numerous resources exist to provide *general* guidelines for retirement savings, individual circumstances and preferences will vary and necessitate computing a benefit that satisfies one's *personal* retirement goals. For example, the recommended savings rate is 10–14 percent of salary for a twenty-five-year-old with annual income between $40,000 and $80,000, enrolled in Social Security, no prior retirement savings, and a target income replacement rate of 80 percent. See R. Ibbotson et al., "National Savings Rate Guidelines for Individuals," *Journal of Financial Planning* 20, no. 4 (2007), 50–61. In general, teachers not enrolled in Social Security should plan to contribute an additional 12 percent of salary.

71. Almost all retirement systems refund at least the employee's own contributions. There are a few exceptions, however, where a refund benefit is actually less than what the teacher contributed. For instance, Illinois keeps 1 percent of earnings for survivor benefits (https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

72. States vary by whether they credit interest to teacher refunds, and those that do so also vary on the rate of interest that is credited. Nearly all plans that credit interest do so at rates well below the plans' own assumed investment returns. Some states, such as Wisconsin, allow teachers to keep their contributions with the system even after they separate from service; their funds can continue to accrue interest and may be withdrawn later.

73. Feature: M. Hiltzik, "Longtime Teachers' Pensions Are Well Earned," Los Angeles Times, September 25, 2015, http://www.latimes.com/business/hiltzik/la-fi-hiltzik-20150925-column.html. Obstacle: Aldeman and Johnson, *Negative Returns*, http://www.teacherpensions.org/sites/default/files/TeacherPensions_Negative%20Returns_Final.pdf.

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75. A. Munnell and P. Perun, "An Update on Private Pensions," *Issue in Brief* 50 (Boston: Boston College Center for Retirement Research, August 2006), http://crr.bc.edu/wp-content/uploads/2006/08/ib_50_508.pdf.

76. S. Holden et al., "401(k) Plans: A 25-Year Retrospective," *Research Perspective* 12, no. 2 (Washington, D.C.: Investment Company Institute, November 2006), https://www.ici.org/pdf/per12-02.pdf.

77. This encapsulates the tradeoff between DB and DC plans. Under DB plans, the employer assumes all financial risk because it guarantees benefits. Under DC plans, the teacher assumes financial risk because benefits are not guaranteed and rather are determined by investment performance.

78. Costrell and Podgursky, "Peaks, Cliffs, and Valleys."

79. Costrell and Podgursky, "Distribution of Benefits in Teacher Retirement Systems and Their Implications for Mobility."

80. C. Koedel et al., "Pension-Induced Rigidities in the Labor Market for School Leaders"; C. Koedel et al., "*Defined Benefit Pension Plans and Job Lock: Evidence from the Education Sector*, Working Paper 1310 (Columbia, MO: University of Missouri, 2013).

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85. M. Chingos and M. West, *When Teachers Choose Pension Plans: The Florida Story* (Washington, D.C.: Thomas B. Fordham Institute, 2013), https://edexcellence.net/publications/when-teachers-choose-pension-plans.html.

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87. D. Goldhaber and C. Grout, *Which Plan to Choose? The Determinants of Pension System Choice for Public School Teachers*. CEDR Working Paper 2014-1 (Seattle: University of Washington Center for Education Data and Research, 2014), http://www.cedr.us/papers/working/CEDR%20WP%202013-1_Which%20Plan%20to%20Choose%20(4-3).pdf.

88. B. Almeida and W. Fornia, *A Better Bang for the Buck: The Economic Efficiencies of Defined Benefit Pension Plans* (Washington, D.C.: National Institute on Retirement Security, 2008), http://www.nirsonline.org/index.php?option=com_content&task=view&id=121&Itemid=48; Fornia and Rhee, Are California Teachers Better Off with a Pension or a 401(k)?

89. J. McGee, *Defined Contribution Pensions are Cost-Effective*.

90. NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

91. Costrell and Podgursky, "Peaks, Cliffs, and Valleys"; Costrell and McGee, "Teacher Pension Incentives, Retirement Behavior, and Potential for Reform in Arkansas."

92. E. Arias, "United States Life Tables, 2007."

DISTRICT PROFILES

DEFINED BENEFIT PLANS

Mobile County Public School System (Alabama) 51
Mesa Public Schools (Arizona) 57
Little Rock School District (Arkansas) 63
Los Angeles Unified School District (California) 69
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Hartford Public Schools (Connecticut) 81
Christina School District (Delaware) 88
District of Columbia Public Schools (Washington, D.C.) 94
Gwinnett County Public Schools (Georgia) 100
Hawaii State Department of Education (Hawaii) 107
Joint School District No. 2 ("West Ada School District") (Idaho) 113
Chicago Public Schools (Illinois) 119
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Bismark Public School District (North Dakota) 236
Oklahoma City Public Schools (Oklahoma) 242

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Houston Independent School District (Texas) 260
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Providence Public School District (Rhode Island) 340
Shelby County Schools (Tennessee) 347
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Seattle Public Schools (Washington) 362

MOBILE COUNTY PUBLIC SCHOOL SYSTEM (ALABAMA)

SUMMARY

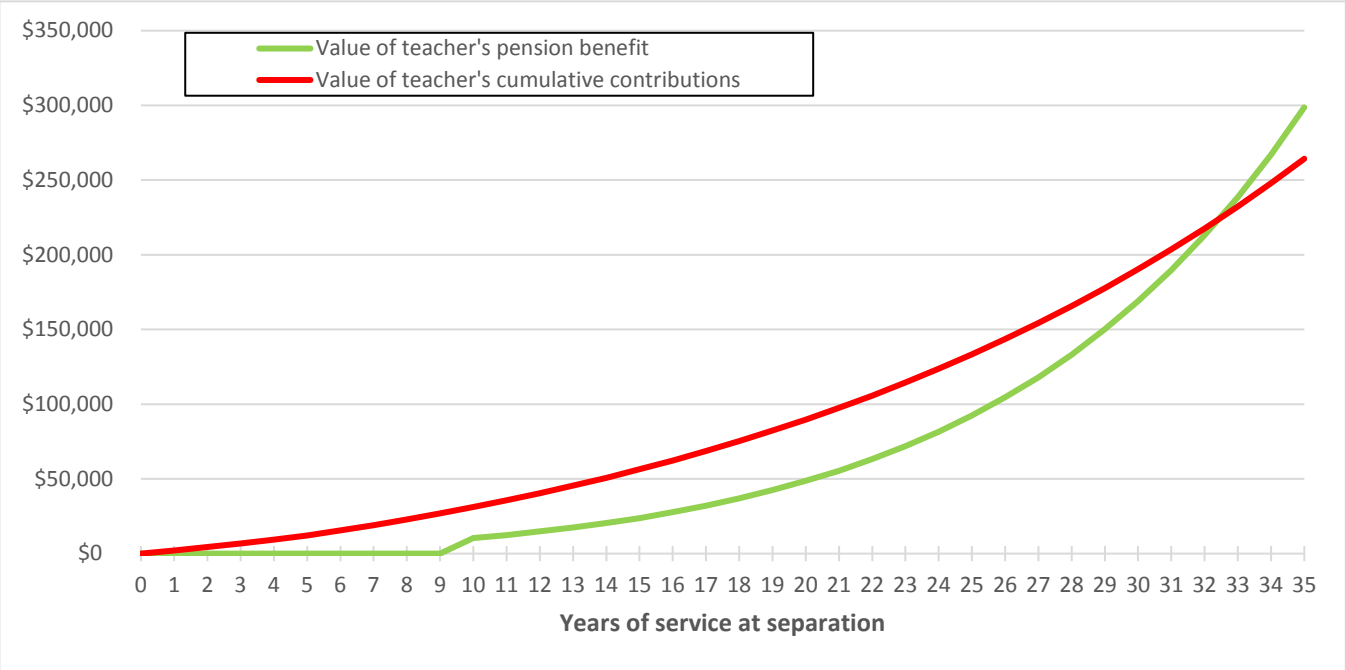
A new Mobile County Public School System teacher enrolls in a traditional defined benefit plan under the Alabama Teachers' Retirement System. In Mobile County, the crossover point occurs after 33 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is less than the value of her cumulative contributions. This is even longer than the national median crossover point of the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	58,802
Teachers (FTE)	3,412

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	135,768
Total members	233,575

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of September, 2011)

Figure 1: A new teacher in the Mobile County Public School System must remain in the pension system for 33 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Mobile County, a new teacher must stay 33 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Mobile County teacher who leaves after five years of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $12,211 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 12,211	-$ 12,211
40	15	$ 23,807	$ 56,390	-$ 32,582
50	25	$ 92,429	$ 133,334	-$ 40,905
58	33	$ 238,517	$ 232,333	$ 6,184

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 62. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $23,807, but at this point she has contributed a total of $56,390. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Mobile County teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is larger than was mid-career. At this point, she's contributed $133,334 but would only expect to receive $92,429 in benefits.

AT THE CROSSOVER

After 33 years, a Mobile County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $232,333 into the system and can expect lifetime pension wealth accrual worth $238,517. Her net benefit becomes positive, though small ($6,184).

Bottom line: Alabama teachers who start at age 25 under the Mobile County Public School System salary schedule must wait 33 years to reach the crossover point. Teachers who exit the Alabama retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 33 years.

Retirement System

Teachers working in the Mobile County Public School System belong to a traditional defined benefit pension plan in the Alabama Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits:

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 62/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): none

Employer and employee contributions:

- Employee contribution rate: 6.0 percent of salary
- Employer contribution rate: 10.84 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula:

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.65%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Mobile County teacher qualifies for full pension benefits at age 62 with 10 years of service. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.65 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does not offer reduced pension benefits for early retirement.

The employer contribution rate is set at 10.84 percent of earnings. The employee contribution rate is set at 6.0 percent of earnings.

Mobile County teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from 2007 CDC Life Tables[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Mobile County Public School System

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,116	-$ 2,116
27	2	$ 0	$ 4,345	-$ 4,345
28	3	$ 0	$ 6,694	-$ 6,694
29	4	$ 0	$ 9,380	-$ 9,380
30	5	$ 0	$ 12,211	-$ 12,211
31	6	$ 0	$ 15,542	-$ 15,542
32	7	$ 0	$ 19,053	-$ 19,053
33	8	$ 0	$ 22,868	-$ 22,868
34	9	$ 0	$ 26,889	-$ 26,889
35	10	$ 10,346	$ 31,163	-$ 20,816
36	11	$ 12,438	$ 35,666	-$ 23,227
37	12	$ 14,826	$ 40,410	-$ 25,585
38	13	$ 17,475	$ 45,461	-$ 27,986
39	14	$ 20,475	$ 50,783	-$ 30,308
40	15	$ 23,807	$ 56,390	-$ 32,582
41	16	$ 27,692	$ 62,364	-$ 34,671
42	17	$ 32,081	$ 68,658	-$ 36,577
43	18	$ 36,912	$ 75,290	-$ 38,378
44	19	$ 42,457	$ 82,316	-$ 39,860
45	20	$ 48,697	$ 89,719	-$ 41,023
46	21	$ 55,485	$ 97,520	-$ 42,035
47	22	$ 63,253	$ 105,777	-$ 42,524
48	23	$ 71,963	$ 114,477	-$ 42,514
49	24	$ 81,533	$ 123,644	-$ 42,111
50	25	$ 92,429	$ 133,334	-$ 40,905
51	26	$ 104,625	$ 143,544	-$ 38,919
52	27	$ 117,995	$ 154,303	-$ 36,307
53	28	$ 133,207	$ 165,669	-$ 32,462
54	29	$ 150,212	$ 177,646	-$ 27,433
55	30	$ 168,898	$ 190,265	-$ 21,367
56	31	$ 189,745	$ 203,561	-$ 13,816
57	32	$ 213,006	$ 217,571	-$ 4,565
58	33	$ 238,517	$ 232,333	$ 6,184
59	34	$ 266,960	$ 247,887	$ 19,073
60	35	$ 298,692	$ 264,275	$ 34,417

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $12,211 (B). Her net pension wealth accrued at this point is -$12,211, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005) http://nces.ed.gov/pubs2005/2005114.pdf.

[8] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

MESA PUBLIC SCHOOLS (ARIZONA)

SUMMARY

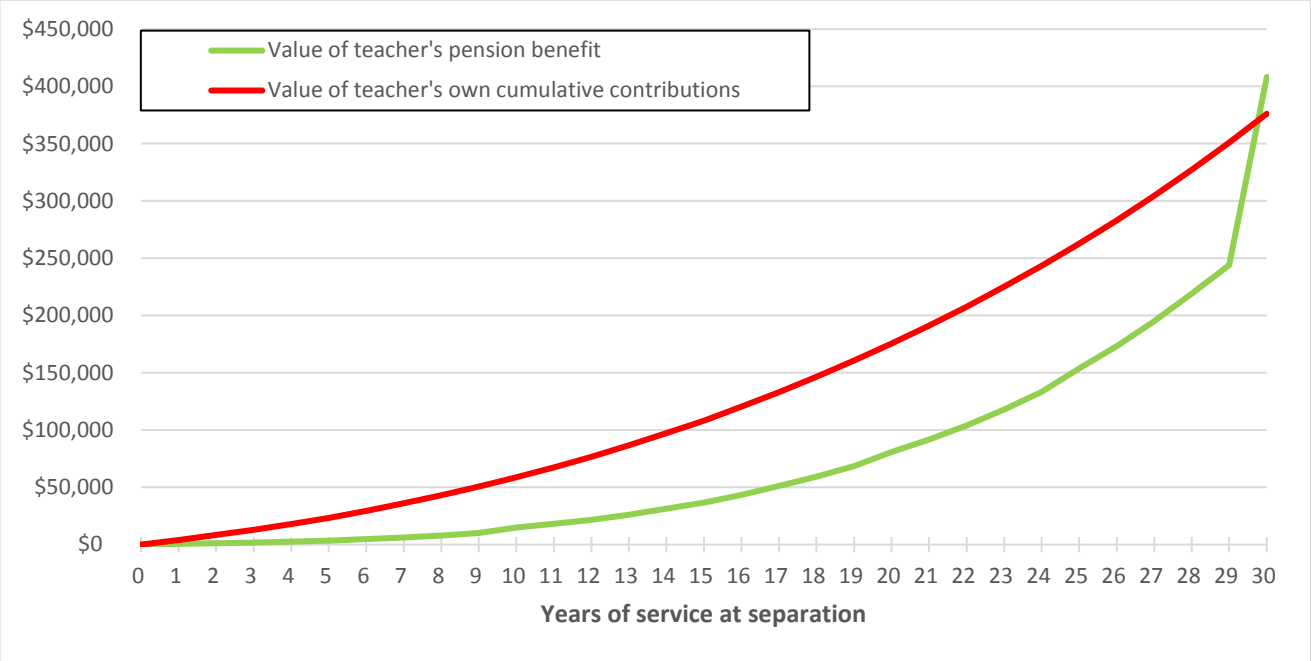
Mesa Public Schools teachers enroll in a traditional defined benefit plan under the Arizona State Retirement System. In Mesa, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1] The long crossover point in Mesa occurs even despite the fact that Arizona's defined benefit system has no vesting period—the *only* such system in this study where this is the case.

About the District	
Students	32,464
Teachers (FTE)	1,745

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	214,346
Total members	535,501

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members.)

Figure 1: A new teacher in Mesa Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Mesa, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Mesa teacher who leaves after **three years** of service is already eligible to receive pension benefits once she reaches retirement age (Table 1). At this point her pension wealth is $1,780, and after three years her cumulative contributions into the retirement system are worth $12,881.[6] (Arizona is the only state in which a teacher vests into a defined benefit plan immediately. Other states have vesting periods ranging from three to ten years. Despite the immediate vesting, however, she still has a negative net benefit at this point, and will continue to do so until she reaches the crossover.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 1,780	$ 12,881	-$ 11,101
40	15	$ 36,651	$ 108,283	-$ 71,633
50	25	$ 153,799	$ 262,768	-$ 108,969
55	30	$ 408,235	$ 376,114	$ 32,121

MID-CAREER

Say a Mesa teacher separates from the retirement system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $36,651, but at this point she has contributed a total of $108,283. Not only has she still not yet reached the crossover point, but her pension wealth is only worth about one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Mesa teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is even larger than it was mid-career. At this point, she's contributed $262,768 but would only expect to receive $153,799 in benefits.

AT THE CROSSOVER

After 30 years, a Mesa teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $376,114 into the system and can expect lifetime pension wealth accrual worth $408,235. Her net benefit becomes positive, though fairly modest ($32,121).

Bottom line: Arizona teachers who start at age 25 under the Mesa Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Arizona retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

Retirement System

Teachers working in Mesa Public Schools belong to a traditional defined benefit pension plan in the Arizona State Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: none; vesting is immediate
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/any; 62/10; 60/25; 55/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): 50/5

Employer and employee contributions

- Employee contribution rate: 11.35 percent of salary
- Employer contribution rate: 11.35 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (MULTIPLIER) x (YOS) x (FAS)

Where the MULTIPLIER varies according to years of service at retirement; YOS = number of years of service; and FAS = final average salary, the average of the five highest years of creditable earnings.

Years of Service	Multiplier
00.00-19.99	2.1%
20.00-24.99	2.15%
25.00-29.99	2.2%
30.00 or more	2.3%

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Mesa teacher qualifies for full pension benefits at age 65 with any years of service, age 62 with ten years of service, or age 55 with 30 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor between 2.1 and 2.3 percent, depending on how many years of service she has upon retirement. A teacher vests into the pension system immediately—meaning she immediately qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at age 50 with five years of service.

The employer contribution rate is set at 11.35 percent of earnings. The employee contribution rate is set at 11.35 percent of earnings. Mesa teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from 2007 CDC Life Tables[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Mesa Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 521	$ 4,071	-$ 3,551
27	2	$ 1,112	$ 8,361	-$ 7,249
28	3	$ 1,780	$ 12,881	-$ 11,101
29	4	$ 2,585	$ 17,957	-$ 15,372
30	5	$ 3,490	$ 23,305	-$ 19,815
31	6	$ 4,681	$ 29,329	-$ 24,648
32	7	$ 6,199	$ 36,048	-$ 29,849
33	8	$ 8,015	$ 43,128	-$ 35,112
34	9	$ 10,053	$ 50,588	-$ 40,535
35	10	$ 14,831	$ 58,820	-$ 43,990
36	11	$ 18,139	$ 67,495	-$ 49,356
37	12	$ 21,692	$ 76,635	-$ 54,943
38	13	$ 26,120	$ 86,638	-$ 60,519
39	14	$ 31,224	$ 97,178	-$ 65,954
40	15	$ 36,651	$ 108,283	-$ 71,633
41	16	$ 43,390	$ 120,357	-$ 76,968
42	17	$ 51,109	$ 133,079	-$ 81,970
43	18	$ 59,262	$ 146,484	-$ 87,222
44	19	$ 68,486	$ 160,608	-$ 92,122
45	20	$ 80,785	$ 175,489	-$ 94,704
46	21	$ 91,811	$ 191,170	-$ 99,359
47	22	$ 104,125	$ 207,691	-$ 103,567
48	23	$ 117,869	$ 225,099	-$ 107,230
49	24	$ 133,203	$ 243,441	-$ 110,239
50	25	$ 153,799	$ 262,768	-$ 108,969
51	26	$ 173,307	$ 283,131	-$ 109,824
52	27	$ 195,052	$ 304,587	-$ 109,535
53	28	$ 219,114	$ 327,195	-$ 108,081
54	29	$ 243,935	$ 351,015	-$ 107,080
55	30	$ 408,235	$ 376,114	$ 32,121

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,490 (A) and her cumulative contributions are worth $23,305 (B). Her net pension wealth accrued at this point is -$19,815, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[8] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

LITTLE ROCK SCHOOL DISTRICT (ARKANSAS)

SUMMARY

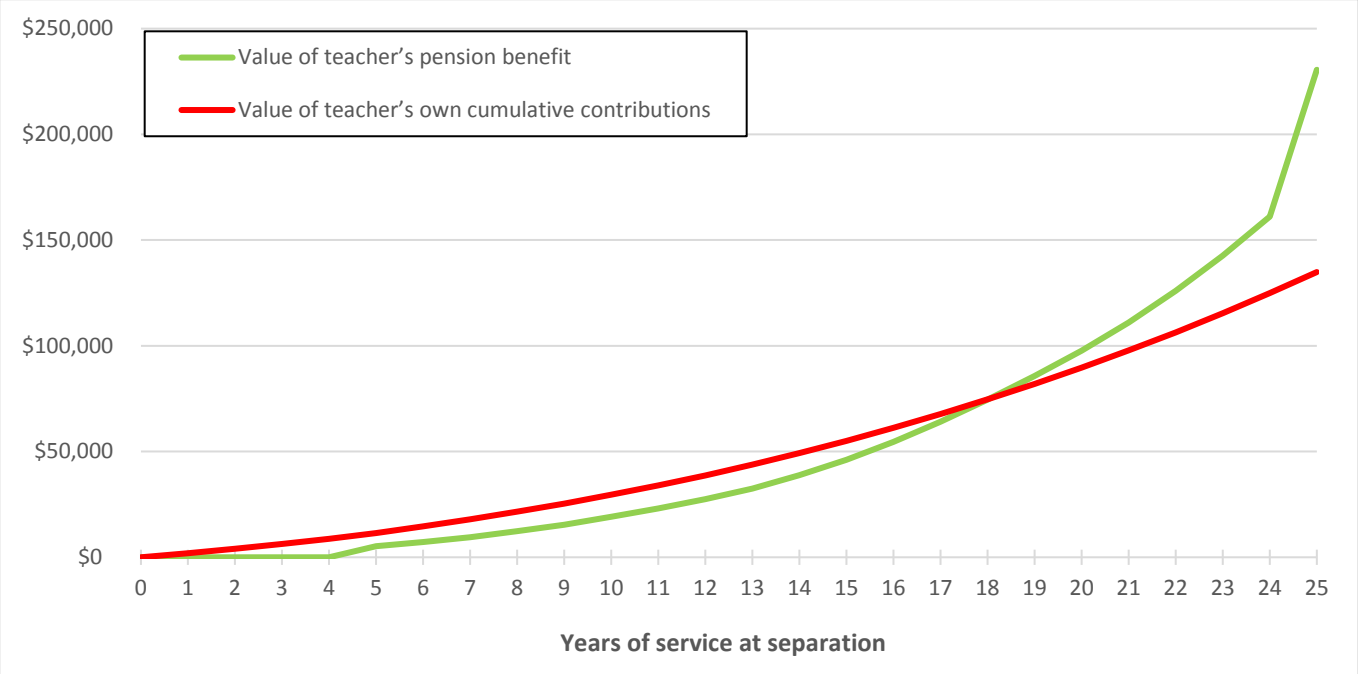
Little Rock School District teachers enroll in a traditional defined benefit plan under the Arkansas Teacher Retirement System. In Little Rock, the crossover point occurs after 19 years of service, meaning that until that point the value of what she would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, but still longer than the career of the majority of American teachers.[1]

About the District	
Students	25,110
Teachers (FTE)	1,757

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	72,293
Total members	121,318

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2011)

Figure 1: A new teacher in Little Rock must remain in the pension system for 19 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Little Rock, a new teacher must stay 19 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Little Rock teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at three years she has contributed $6,342 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 6,342	-$ 6,342
40	15	$ 46,136	$ 55,014	-$ 8,878
44	19	$ 85,788	$ 82,019	$ 3,769
50	25	$ 230,542	$ 134,885	$ 95,657

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age. [7] Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $46,136, but at this point she has contributed a total of $55,014. Not only has she not yet reached the crossover point, but her pension wealth is worth nearly $9,000 less than her cumulative contributions.

AT THE CROSSOVER

After 19 years, a Little Rock teacher finally reaches the crossover point—meaning her benefits are worth more than contributions. At that point, she will have contributed a total of $82,019 into the system and can expect lifetime pension wealth accrual worth $85,788. Her net benefit becomes positive, though small ($3,769).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Little Rock teacher's net benefit is $95,657, but it takes her quite a long time to reach that point. (Said another way, even after the crossover point in Figure 1, the red and green lines are still close together. Benefits only minimally exceed contributions between the crossover point and 25 years of service.)

Bottom line: Arkansas teachers who start at age 25 under the Little Rock School District salary schedule must wait 19 years to reach the crossover point. Teachers who exit the Arkansas retirement system early, or even after a somewhat lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 19 years.

Retirement System:

Teachers working in Little Rock belong to a traditional defined benefit pension plan in the Arkansas Teacher Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/5 and any/28
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/25

Employer and employee contributions

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: 14 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.15%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Little Rock teacher qualifies for full pension benefits at any age with 28 years of service, or at age 60 with five years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 2.15 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at any age with 25 years of service.

The employer contribution rate is set at 14 percent of earnings. The employee contribution rate is set at 6 percent of earnings.

Little Rock teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Little Rock School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,968	-$ 1,968
27	2	$ 0	$ 4,079	-$ 4,079
28	3	$ 0	$ 6,342	-$ 6,342
29	4	$ 0	$ 8,801	-$ 8,801
30	5	$ 5,308	$ 11,468	-$ 6,160
31	6	$ 7,226	$ 14,651	-$ 7,425
32	7	$ 9,540	$ 17,981	-$ 8,441
33	8	$ 12,310	$ 21,564	-$ 9,254
34	9	$ 15,450	$ 25,416	-$ 9,966
35	10	$ 19,133	$ 29,550	-$ 10,417
36	11	$ 23,040	$ 33,981	-$ 10,941
37	12	$ 27,490	$ 38,726	-$ 11,236
38	13	$ 32,543	$ 43,801	-$ 11,258
39	14	$ 38,857	$ 49,224	-$ 10,367
40	15	$ 46,136	$ 55,014	-$ 8,878
41	16	$ 54,510	$ 61,190	-$ 6,681
42	17	$ 64,124	$ 67,774	-$ 3,649
43	18	$ 74,565	$ 74,710	-$ 145
44	19	$ 85,788	$ 82,019	$ 3,769
45	20	$ 97,723	$ 89,720	$ 8,003
46	21	$ 111,060	$ 97,834	$ 13,226
47	22	$ 125,955	$ 106,384	$ 19,571
48	23	$ 142,581	$ 115,392	$ 27,189
49	24	$ 161,130	$ 124,884	$ 36,246
50	25	$ 230,542	$ 134,885	$ 95,657

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $5,308 (A) and her cumulative contributions are worth $11,468 (B). Her net pension wealth accrued at this point is -$6,160, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

LOS ANGELES UNIFIED SCHOOL DISTRICT (CALIFORNIA)

SUMMARY

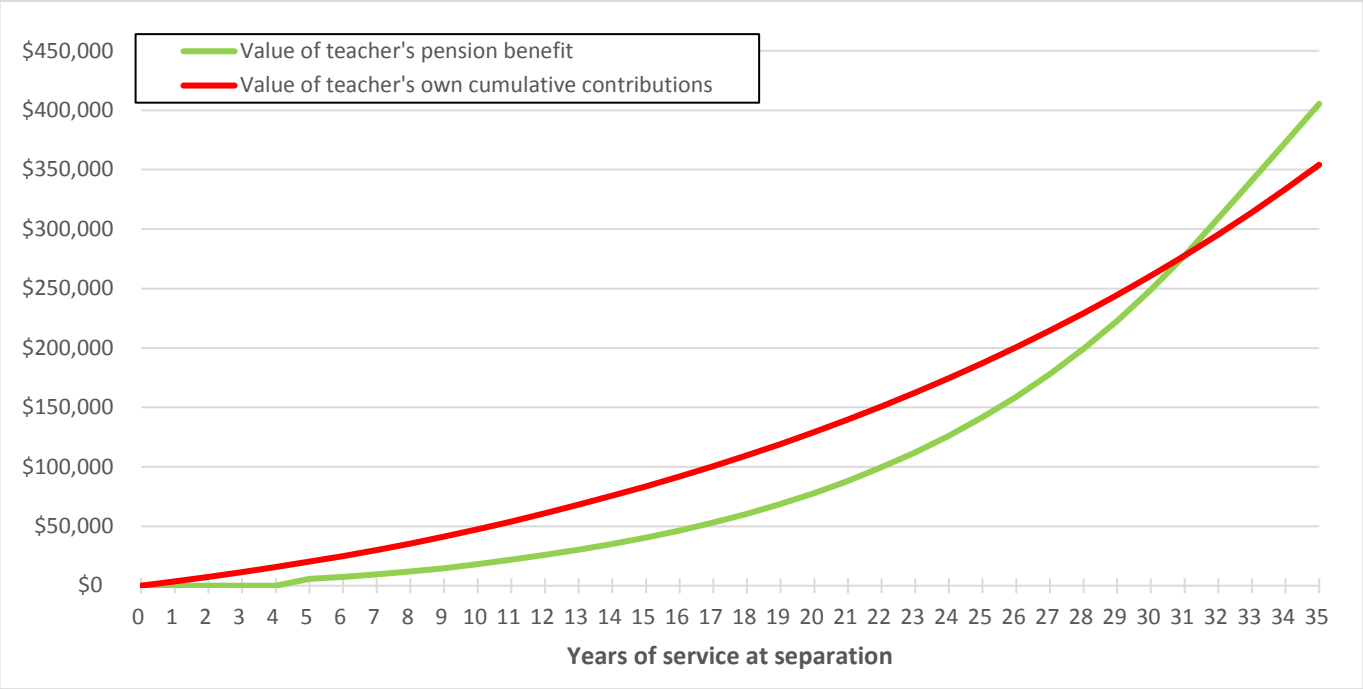
A new Los Angeles Unified School District teacher enrolls in a traditional defined benefit plan under the California State Teachers Retirement System. In Los Angeles, the crossover point occurs after 31 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	653,826
Teachers (FTE)	27,748

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	429,600
Total members	856,360

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2011)

Figure 1: A new teacher in the Los Angeles Unified School District must remain in the pension system for 31 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Los Angeles, a new teacher must stay 31 years to reach the cross-over point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Los Angeles teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $11,473 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 11,473	-$ 11,473
40	15	$ 40,411	$ 83,575	-$ 43,164
50	25	$ 141,793	$ 187,257	-$ 45,464
56	31	$ 277,814	$ 277,770	$ 44

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 62. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $40,411, but at this point she has contributed a total of $83,575. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Los Angeles teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is slightly larger than was mid-career. At this point, she's contributed $187,257 but would only expect to receive $141,793 in benefits.

AT THE CROSSOVER

After 31 years, a Los Angeles teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $277,770 into the system and can expect lifetime pension wealth accrual worth $277,814. Her net benefit becomes positive, though tiny ($44), and increases every year thereafter.

Bottom line: California teachers who start at age 25 under the Los Angeles Unified School District salary schedule must wait 31 years to reach the crossover point. Teachers who exit the California retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 31 years.

Retirement System

Teachers working in the Los Angeles Unified School District belong to a traditional defined benefit pension plan in the California State Teachers Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): 62/5
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions

- Employee contribution rate: 8.0 percent of salary
- Employer contribution rate: 13.79 percent of salary (divided between the district and state)
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Los Angeles teacher qualifies for full pension benefits at age 62 with five years of service. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service.

The employer contribution rate is set at 13.79 percent of earnings, divided between the district and the state. The employee contribution rate is set at 8.0 percent of earnings.

Los Angeles teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from 2007 CDC Life Tables[11]
- Teacher salary schedule for 2012-13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012-13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Los Angeles Unified Public School District

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,629	-$ 3,629
27	2	$ 0	$ 7,439	-$ 7,439
28	3	$ 0	$ 11,473	-$ 11,473
29	4	$ 0	$ 15,743	-$ 15,743
30	5	$ 5,688	$ 20,226	-$ 14,539
31	6	$ 7,405	$ 24,980	-$ 17,575
32	7	$ 9,431	$ 30,072	-$ 20,641
33	8	$ 11,850	$ 35,502	-$ 23,653
34	9	$ 14,751	$ 41,332	-$ 26,581
35	10	$ 18,137	$ 47,562	-$ 29,425
36	11	$ 21,897	$ 54,095	-$ 32,198
37	12	$ 25,934	$ 60,947	-$ 35,013
38	13	$ 30,234	$ 68,134	-$ 37,900
39	14	$ 35,042	$ 75,671	-$ 40,629
40	15	$ 40,411	$ 83,575	-$ 43,164
41	16	$ 46,402	$ 91,866	-$ 45,464
42	17	$ 53,079	$ 100,560	-$ 47,482
43	18	$ 60,515	$ 109,679	-$ 49,164
44	19	$ 68,793	$ 119,243	-$ 50,450
45	20	$ 78,000	$ 129,273	-$ 51,273
46	21	$ 88,235	$ 139,792	-$ 51,557
47	22	$ 99,606	$ 150,824	-$ 51,218
48	23	$ 112,232	$ 162,395	-$ 50,163
49	24	$ 126,245	$ 174,530	-$ 48,285
50	25	$ 141,793	$ 187,257	-$ 45,464
51	26	$ 159,039	$ 200,605	-$ 41,566
52	27	$ 178,165	$ 214,604	-$ 36,439
53	28	$ 199,371	$ 229,286	-$ 29,915
54	29	$ 222,879	$ 244,684	-$ 21,805
55	30	$ 248,935	$ 260,833	-$ 11,898
56	31	$ 277,814	$ 277,770	$ 44
57	32	$ 309,209	$ 295,533	$ 13,676
58	33	$ 341,027	$ 314,163	$ 26,864
59	34	$ 373,138	$ 333,701	$ 39,437
60	35	$ 405,408	$ 354,192	$ 51,216

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $5,688 (A) and her cumulative contributions are worth $20,226 (B). Her net pension wealth accrued at this point is -$14,539, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[8] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

JEFFERSON COUNTY (JEFFCO) PUBLIC SCHOOLS (COLORADO)

SUMMARY

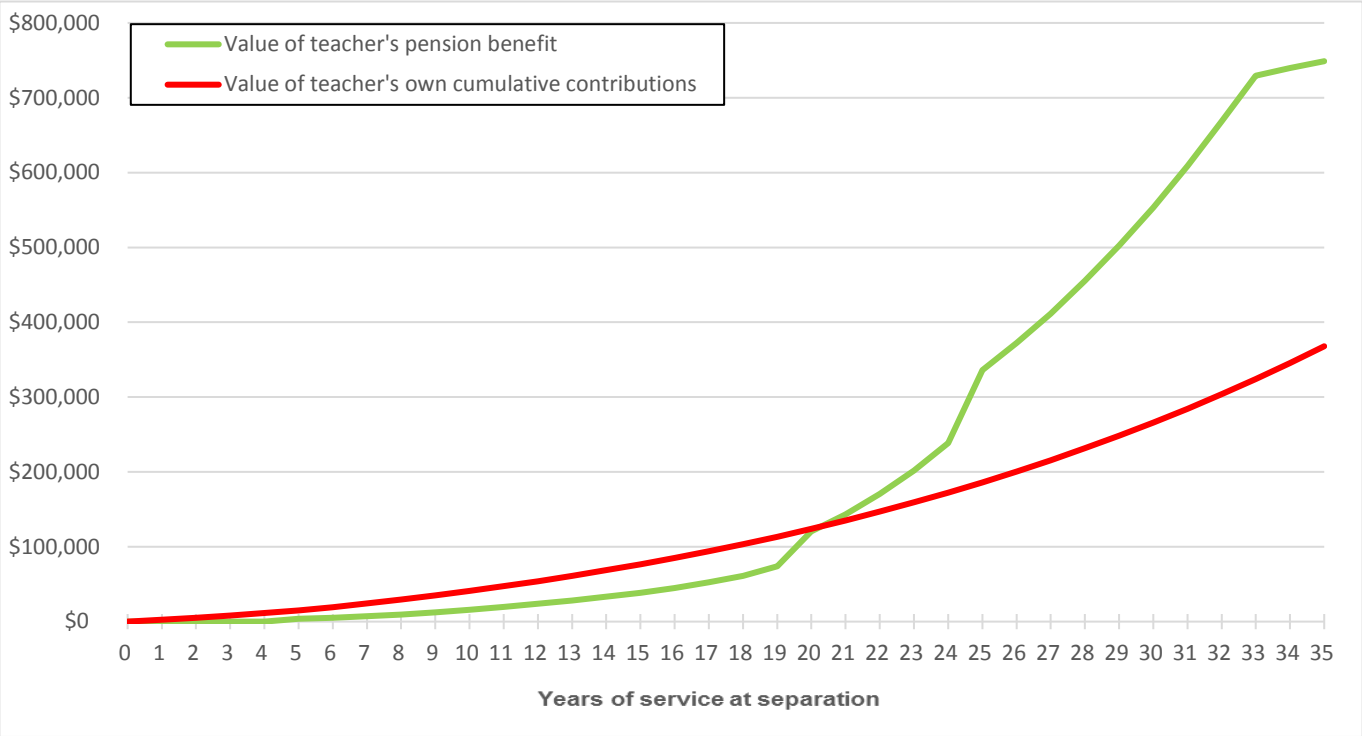
Jefferson County (Jeffco) teachers enroll in a traditional defined benefit plan under the Colorado Public Employees' Retirement Association. In Jeffco, the crossover point occurs after 21 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, but still longer than the career of the majority of American teachers.[1]

About the District	
Students	86,011
Teachers (FTE)	4,780

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	114,820
Total members	267,193

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of December, 2011; includes all members)

Figure 1: A new teacher in Jefferson County (Jeffco) Public Schools must remain in the pension system for 21 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Jefferson County, a new teacher must stay 21 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Jeffco teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $8,307 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 8,307	-$ 8,307
40	15	$ 38,619	$ 76,425	-$ 37,806
46	21	$ 143,322	$ 135,149	$ 8,172
50	25	$ 335,872	$ 186,043	$ 149,829

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $38,619, but at this point she has contributed a total of $76,425. Not only has she not yet reached the crossover point, but her pension wealth is only half of her cumulative contributions.

AT THE CROSSOVER

After 21 years, a Jeffco teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $135,149 into the system and can expect lifetime pension wealth accrual worth $143,322. Her net benefit becomes positive, though small ($8,172).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Jeffco teacher's net benefit is $149,829 (and will continue to grow thereafter).

Bottom line: Colorado teachers who start at age 25 under the Jefferson County Public Schools salary schedule must wait 21 years to reach the crossover point. Teachers who exit the Colorado retirement system early, or even after a somewhat lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 21 years.

Retirement System:

Teachers working in Jeffco Public Schools belong to a traditional defined benefit pension plan in the Colorado Public Employees' Retirement Association.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/any, 58/30, and any/35
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 50/25, 55/20, and 60/5

Employer and employee contributions

- Employee contribution rate: 8 percent of salary
- Employer contribution rate: 16.43 percent of salary
- Refundable contributions: employee contributions, with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Jeffco teacher qualifies for full pension benefits at any age with 35 years of service, age 58 with 30 years of service, or age 65 with any years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 2.5 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 50 with 25 years of service, age 55 with 20 years of service, or age 60 with 5 years of service, whichever comes first.

The employer contribution rate is set at 16.43 percent of earnings. The employee contribution rate is set at 8 percent of earnings. Jeffco teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from 2007 CDC Life Tables[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Jefferson County (Jeffco) Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,545	-$ 2,545
27	2	$ 0	$ 5,310	-$ 5,310
28	3	$ 0	$ 8,307	-$ 8,307
29	4	$ 0	$ 11,545	-$ 11,545
30	5	$ 3,786	$ 15,037	-$ 11,252
31	6	$ 5,293	$ 19,396	-$ 14,103
32	7	$ 7,178	$ 24,136	-$ 16,958
33	8	$ 9,513	$ 29,275	-$ 19,762
34	9	$ 12,385	$ 34,833	-$ 22,448
35	10	$ 15,890	$ 40,830	-$ 24,940
36	11	$ 19,613	$ 47,288	-$ 27,674
37	12	$ 23,772	$ 54,060	-$ 30,288
38	13	$ 28,363	$ 61,163	-$ 32,801
39	14	$ 33,230	$ 68,613	-$ 35,383
40	15	$ 38,619	$ 76,425	-$ 37,806
41	16	$ 45,067	$ 84,956	-$ 39,888
42	17	$ 52,472	$ 93,950	-$ 41,478
43	18	$ 60,977	$ 103,431	-$ 42,454
44	19	$ 73,906	$ 113,446	-$ 39,540
45	20	$ 120,656	$ 124,010	-$ 3,354
46	21	$ 143,322	$ 135,149	$ 8,172
47	22	$ 170,556	$ 146,892	$ 23,664
48	23	$ 201,646	$ 159,268	$ 42,378
49	24	$ 238,539	$ 172,308	$ 66,231
50	25	$ 335,872	$ 186,043	$ 149,829
51	26	$ 372,361	$ 200,449	$ 171,912
52	27	$ 411,232	$ 215,557	$ 195,675
53	28	$ 455,338	$ 231,582	$ 223,755
54	29	$ 502,477	$ 248,390	$ 254,088
55	30	$ 553,133	$ 266,017	$ 287,117
56	31	$ 608,926	$ 284,503	$ 324,423
57	32	$ 668,661	$ 303,892	$ 364,769
58	33	$ 729,392	$ 324,226	$ 405,165
59	34	$ 739,675	$ 345,553	$ 394,122
60	35	$ 748,851	$ 367,919	$ 380,932

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,786 (A) and her cumulative contributions are worth $15,037 (B). Her net pension wealth accrued at this point is -$11,252, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no .9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

HARTFORD PUBLIC SCHOOLS (CONNECTICUT)

SUMMARY

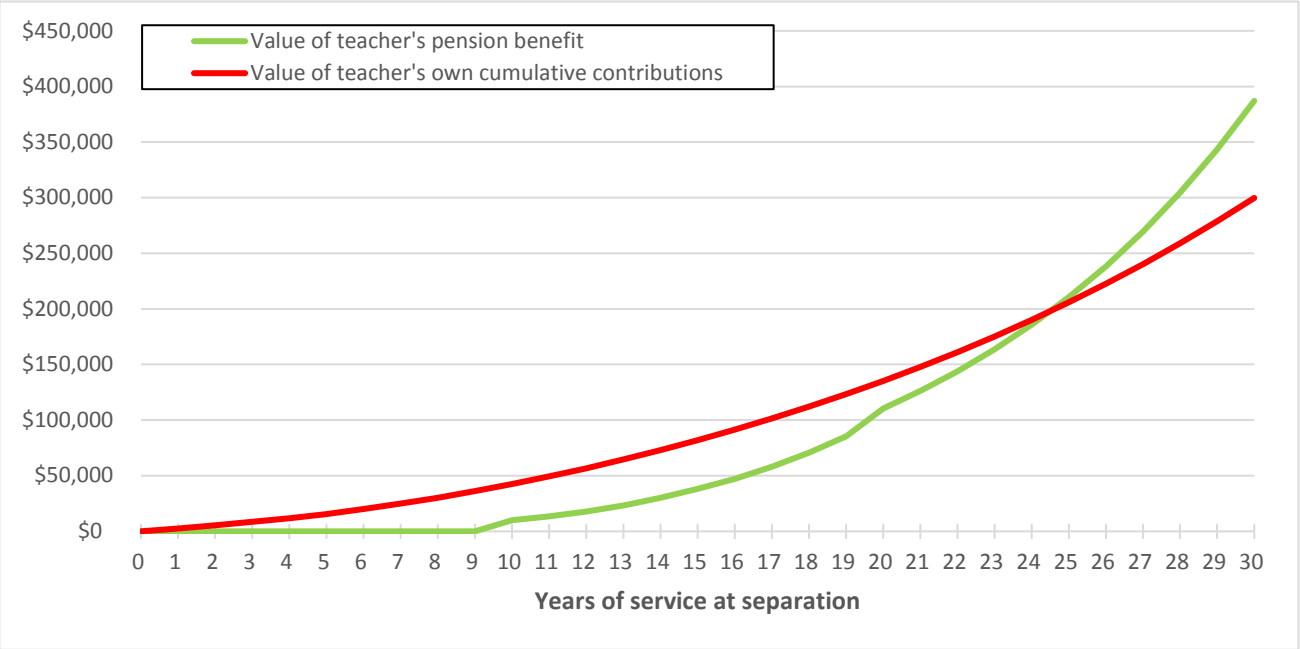
Hartford Public Schools teachers enroll in a traditional defined benefit plan under the Connecticut Teachers' Retirement System. In Hartford, the crossover point occurs after 25 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is just two years shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	21,286
Teachers (FTE)	1,601

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	49,808
Total members	95,987

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Hartford Public Schools must remain in the pension system for 25 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Hartford, a new teacher must stay 25 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Hartford teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $15,550 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 15,550	-$ 15,550
40	15	$ 38,216	$ 82,092	-$ 43,876
45	20	$ 110,544	$ 135,238	-$ 24,694
50	25	$ 210,475	$ 205,869	$ 4,606

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $38,216, but at this point she has contributed a total of $82,092. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 20 YEARS OF SERVICE

A 20-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 20 years, a Hartford teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $135,238 but would only expect to receive $110,544 in benefits.

AT THE CROSSOVER

After 25 years, a Hartford teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $205,869 into the system and can expect lifetime pension wealth accrual worth $210,475. Her net benefit becomes positive, though modest ($4,606). The net benefit increases thereafter—after only one more year it will be more than $15,000.

Bottom line: Connecticut teachers who start at age 25 under the Hartford Public Schools salary schedule must wait 25 years to reach the crossover point. Teachers who exit the Connecticut retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 25 years.

Retirement System

Teachers working in Hartford Public Schools belong to a traditional defined benefit pension plan in the Connecticut Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/20 and any/35 with a minimum of 25 years of service in Connecticut[10]
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of any/25 with a minimum of 20 years of service in Connecticut and 55/20 with a minimum of 15 years of service in Connecticut

Employer and employee contributions

- Employee contribution rate: 6.0 percent of salary
- Employer contribution rate: 23.65 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Hartford teacher qualifies for full pension benefits at age 60 with 20 years of service, or at any age with 35 years of service as long as she has at least 25 years of service in Connecticut (whichever comes first). If she has at least 10 but fewer than 20 years of service, the annual benefit is equal to ten percent of in-state years of service in-state plus one percent of out-of-state years of service, multiplied by the average salary of her final three years. If she has more than 20 years of in-state service, the annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.0 percent.[11] A teacher vests into the pension system after 10 years, meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[12] The plan does offer reduced pension benefits for early retirement, available at any age with 25 years of service (minimum 20 years in-state) or at age 55 with 20 years of service (minimum 15 years in-state), whichever comes first.

The employer contribution rate is set at 23.65 percent of earnings. The employee contribution rate is set at 6.00 percent of earnings. Hartford teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[13]
- Survival probabilities from *2007 CDC Life Tables*[14]
- Teacher salary schedule for 2012–13 school year[15]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[16] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[17]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Hartford Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,561	-$ 2,561
27	2	$ 0	$ 5,373	-$ 5,373
28	3	$ 0	$ 8,450	-$ 8,450
29	4	$ 0	$ 11,836	-$ 11,836
30	5	$ 0	$ 15,550	-$ 15,550
31	6	$ 0	$ 20,000	-$ 20,000
32	7	$ 0	$ 24,882	-$ 24,882
33	8	$ 0	$ 30,282	-$ 30,282
34	9	$ 0	$ 36,155	-$ 36,155
35	10	$ 10,000	$ 42,633	-$ 32,633
36	11	$ 13,580	$ 49,490	-$ 35,910
37	12	$ 17,901	$ 56,749	-$ 38,849
38	13	$ 23,333	$ 64,721	-$ 41,388
39	14	$ 30,027	$ 73,160	-$ 43,133
40	15	$ 38,216	$ 82,092	-$ 43,876
41	16	$ 47,242	$ 91,548	-$ 44,305
42	17	$ 57,952	$ 101,557	-$ 43,605
43	18	$ 70,609	$ 112,151	-$ 41,543
44	19	$ 85,514	$ 123,366	-$ 37,852
45	20	$ 110,544	$ 135,238	-$ 24,694
46	21	$ 126,213	$ 147,804	-$ 21,592
47	22	$ 143,803	$ 161,106	-$ 17,304
48	23	$ 163,538	$ 175,187	-$ 11,649
49	24	$ 185,669	$ 190,092	-$ 4,423
50	25	$ 210,475	$ 205,869	$ 4,606
51	26	$ 238,271	$ 222,570	$ 15,701
52	27	$ 269,408	$ 240,249	$ 29,160
53	28	$ 304,279	$ 258,962	$ 45,317
54	29	$ 343,321	$ 278,771	$ 64,550
55	30	$ 387,024	$ 299,739	$ 87,285

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $15,550 (B). Her net pension wealth accrued at this point is -$15,550, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] Connecticut also offers a proratable retirement, for teachers who retire at age 60 or older with at least 10 years of service in Connecticut but fewer than 20 years of service total. The benefit is a teacher's final average salary times a "total service percentage" equal to [(10%) x (YOS in CT) x (YOS in CT) + (1.0%) x (YOS out-of-state)]

[11] She cannot receive an annual benefit of greater than 75 percent of her final average salary, which is equivalent to a maximum of 37.5 years of applicable years of service. If she has more YOS, her benefit does not increase.

[12] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[13] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[14] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[15] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[16] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[17] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

CHRISTINA SCHOOL DISTRICT (DELAWARE)

SUMMARY

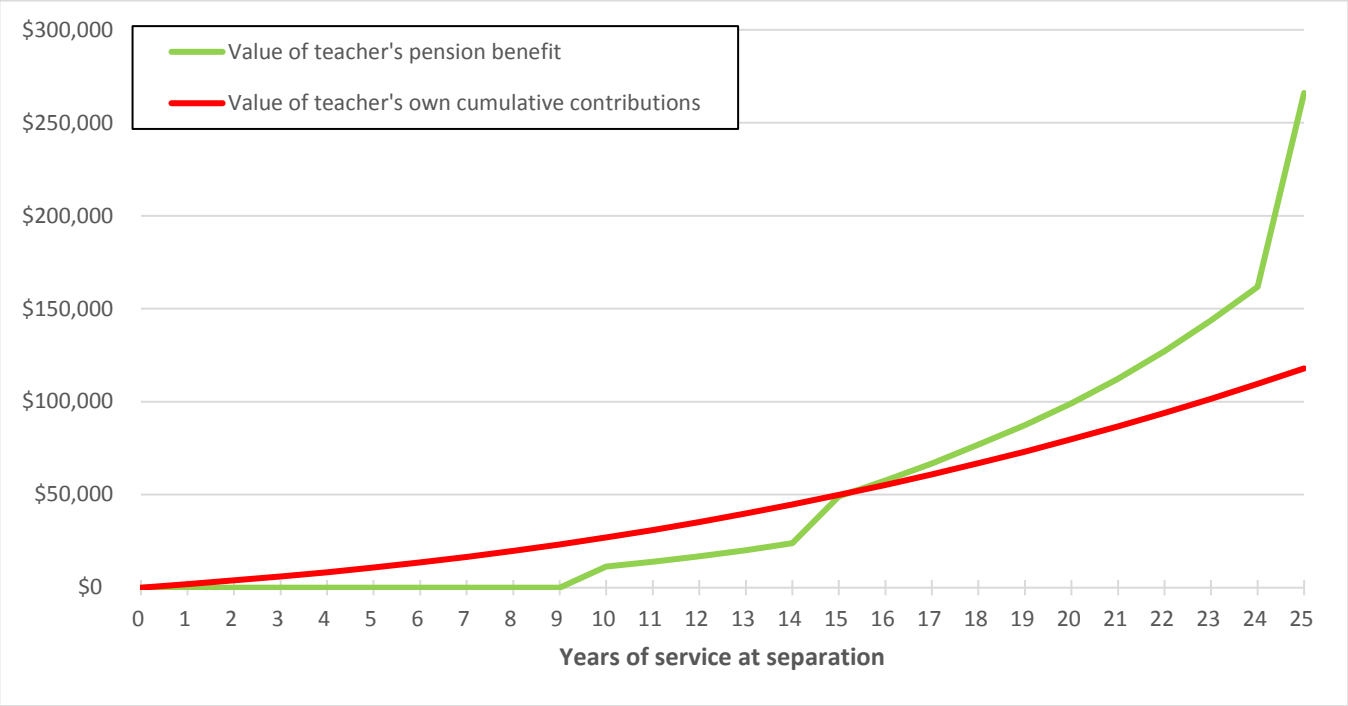
Christina School District teachers enroll in a traditional defined benefit plan under the Delaware State Employees' Pension Plan. In Christina, the crossover point occurs after 16 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is much shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and one of the shortest of the group.[1]

About the District	
Students	16,326
Teachers (FTE)	1,256

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	35,427
Total members	61,034

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in Christina must remain in the pension system for 16 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Christina, a new teacher must stay 16 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Christina teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed $10,861 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 10,861	-$ 10,861
35	10	$ 11,313	$ 27,029	-$ 15,716
41	16	$ 57,606	$ 55,266	$ 2,340
50	25	$ 266,036	$ 117,906	$ 148,130

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] Say she separates from the system at this point. Her pension wealth is $11,313, and she has contributed a total of $27,029. Not only has she not yet reached the crossover point, but her pension wealth is nearly $16,000 less than her cumulative contributions.

AT THE CROSSOVER

After 16 years, a Christina teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $55,266 into the system and can expect lifetime pension wealth accrual worth $57,606. Her net benefit becomes positive, though small ($2,340).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] After 25 years, a Christina teacher's net benefit is $148,130, but it takes her a long time to reach that point. (Said another way, for many years after the crossover point in Figure 1, the red and green lines are still quite close together.)

Bottom line: Delaware teachers who start at age 25 under the Christina School District salary schedule must wait 16 years to reach the crossover point. Teachers who exit the Delaware retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 16 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Christina School District belong to a traditional defined benefit pension plan in the Delaware State Employees' Pension Plan.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/10, 60/20, and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 55/15 and any/25

Employer and employee contributions

- Employee contribution rate: 5 percent of salary
- Employer contribution rate: 9.58 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.85%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Christina teacher qualifies for full pension benefits at age 65 with 10 years of service, age 60 with 20 years, or any age with 30 years, whichever comes first. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 1.85 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at age 55 with 15 years of service or any age with 25 years of service, whichever comes first.

The employer contribution rate is set at 9.58 percent of earnings. The employee contribution rate is set at 5 percent of earnings. Christina teachers do pay into Social Security.

Assumptions for Computing Pension Wealth:

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Christina School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,875	-$ 1,875
27	2	$ 0	$ 3,880	-$ 3,880
28	3	$ 0	$ 6,022	-$ 6,022
29	4	$ 0	$ 8,341	-$ 8,341
30	5	$ 0	$ 10,861	-$ 10,861
31	6	$ 0	$ 13,603	-$ 13,603
32	7	$ 0	$ 16,580	-$ 16,580
33	8	$ 0	$ 19,802	-$ 19,802
34	9	$ 0	$ 23,280	-$ 23,280
35	10	$ 11,313	$ 27,029	-$ 15,716
36	11	$ 13,927	$ 31,063	-$ 17,136
37	12	$ 16,920	$ 35,366	-$ 18,445
38	13	$ 20,222	$ 39,910	-$ 19,688
39	14	$ 23,875	$ 44,729	-$ 20,853
40	15	$ 49,129	$ 49,834	-$ 705
41	16	$ 57,606	$ 55,266	$ 2,340
42	17	$ 66,859	$ 60,963	$ 5,896
43	18	$ 76,877	$ 66,938	$ 9,938
44	19	$ 87,392	$ 73,205	$ 14,187
45	20	$ 99,089	$ 79,777	$ 19,311
46	21	$ 112,402	$ 86,694	$ 25,708
47	22	$ 127,230	$ 93,949	$ 33,281
48	23	$ 143,734	$ 101,558	$ 42,176
49	24	$ 161,681	$ 109,537	$ 52,143
50	25	$ 266,036	$ 117,906	$ 148,130

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $10,861 (B). Her net pension wealth accrued at this point is -$10,861, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

DISTRICT OF COLUMBIA PUBLIC SCHOOLS (WASHINGTON, D.C.)

SUMMARY

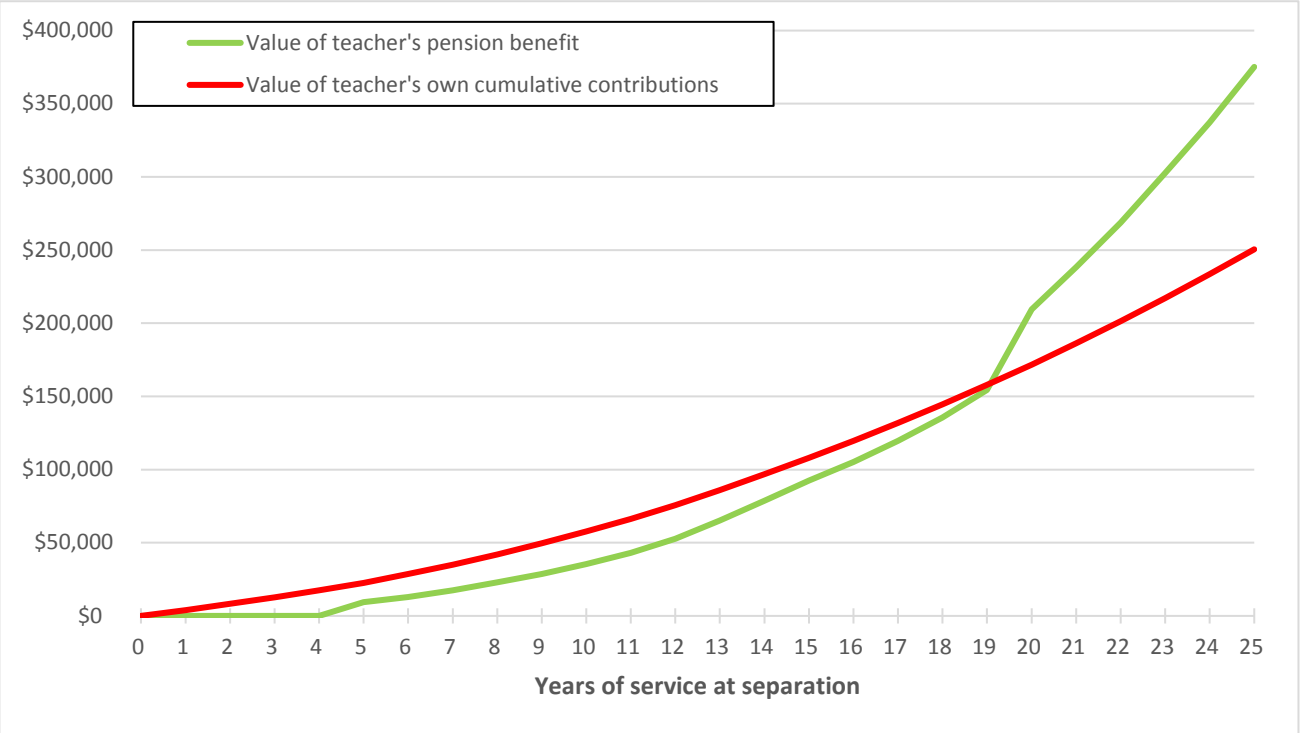
District of Columbia Public Schools (DCPS) teachers enroll in a traditional defined benefit plan under the District of Columbia Teachers' Retirement Plan. In DCPS, the crossover point occurs after 20 years of service, meaning that until that point the value of what teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, but still longer than the career of the majority of American teachers.[1]

About the District	
Students	44,942
Teachers (FTE)	3,374

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	4,495
Total members	8,700

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of September, 2012)

Figure 1: A new teacher in DCPS must remain in the pension system for 20 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In DCPS, a new teacher must stay 20 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A DCPS teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $12,656 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 12,656	-$ 12,656
40	15	$ 92,452	$ 108,050	-$ 15,598
45	20	$ 209,509	$ 171,733	$ 37,776
50	25	$ 375,179	$ 250,506	$ 124,673

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $92,452, but at this point she has contributed a total of $108,050. Not only has she not yet reached the crossover point, but her pension wealth is nearly $16,000 less than her cumulative contributions.

AT THE CROSSOVER

After 20 years, a DCPS teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $171,733 into the system and can expect lifetime pension wealth accrual worth $209,509. Her net benefit becomes positive ($37,776).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a DCPS teacher's net benefit is $124,673. DCPS is one of the few districts in this study in which a teacher's net benefit does not take a number of years to "ramp up" after the crossover point. (In many districts, benefits only minimally exceed contributions until many years after the crossover point.)

Bottom line: District of Columbia teachers who start at age 25 under the DCPS salary schedule must wait 20 years to reach the crossover point. Teachers who exit the retirement system early, or even after a somewhat lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 20 years.

TECHNICAL MATTERS

Retirement System

Teachers working in District of Columbia Public Schools belong to a traditional defined benefit pension plan in the District of Columbia Teachers' Retirement Plan.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/20, 62/5, and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 50/20 and any/25

Employer and employee contributions

- Employee contribution rate: 8 percent of salary
- Employer contribution rate: 11.63 percent of salary
- Refundable contributions: employee contributions, without interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a DCPS teacher qualifies for full pension benefits at any age with 30 years of service, age 60 with 20 years of service, or age 62 with five years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at any age with 25 years of service or age 50 with 20 years of service, whichever comes first.

The employer contribution rate is set at 11.63 percent of earnings. The employee contribution rate is set at 8 percent of earnings. DCPS teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in District of Columbia Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 4,023	-$ 4,023
27	2	$ 0	$ 8,216	-$ 8,216
28	3	$ 0	$ 12,656	-$ 12,656
29	4	$ 0	$ 17,421	-$ 17,421
30	5	$ 9,342	$ 22,522	-$ 13,181
31	6	$ 12,927	$ 28,559	-$ 15,631
32	7	$ 17,378	$ 35,069	-$ 17,690
33	8	$ 22,859	$ 42,070	-$ 19,211
34	9	$ 28,618	$ 49,584	-$ 20,966
35	10	$ 35,322	$ 57,628	-$ 22,306
36	11	$ 43,097	$ 66,225	-$ 23,128
37	12	$ 52,737	$ 75,633	-$ 22,896
38	13	$ 65,149	$ 86,028	-$ 20,879
39	14	$ 78,732	$ 96,828	-$ 18,097
40	15	$ 92,452	$ 108,050	-$ 15,598
41	16	$ 105,169	$ 119,710	-$ 14,541
42	17	$ 119,651	$ 131,910	-$ 12,260
43	18	$ 135,660	$ 144,586	-$ 8,926
44	19	$ 154,338	$ 157,900	-$ 3,561
45	20	$ 209,509	$ 171,733	$ 37,776
46	21	$ 238,319	$ 186,305	$ 52,014
47	22	$ 268,816	$ 201,446	$ 67,370
48	23	$ 302,565	$ 217,177	$ 85,387
49	24	$ 337,177	$ 233,523	$ 103,654
50	25	$ 375,179	$ 250,506	$ 124,673

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $9,342 (A) and her cumulative contributions are worth $22,522 (B). Her net pension wealth accrued at this point is -$13,181, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, with no interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

GWINNETT COUNTY PUBLIC SCHOOLS (GEORGIA)

SUMMARY

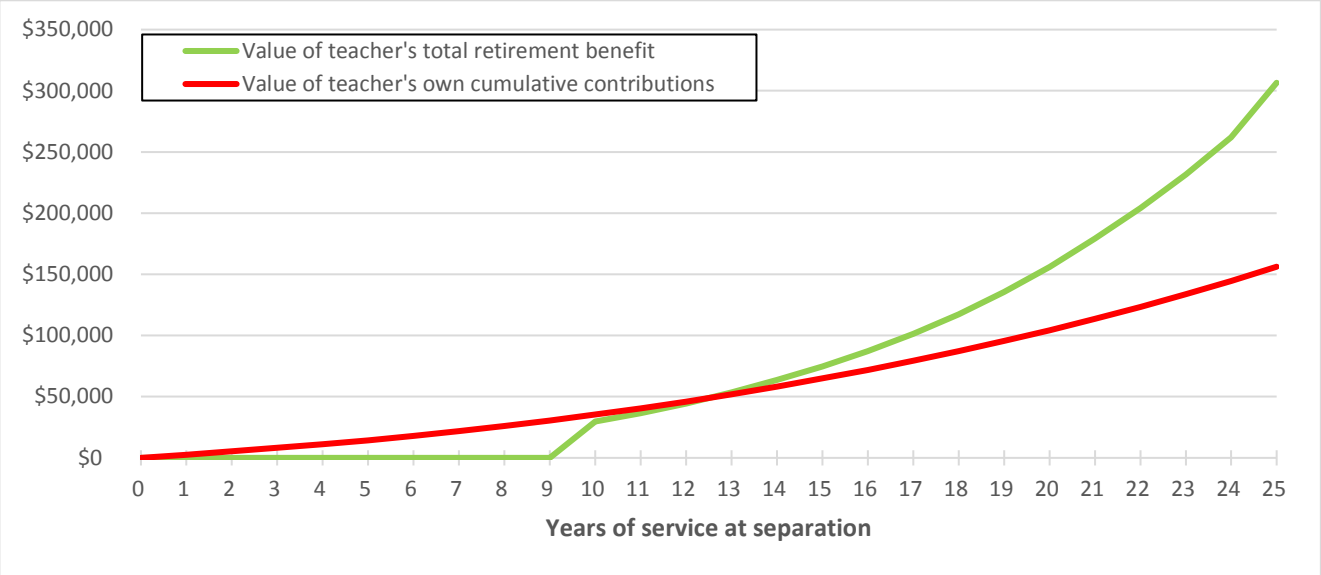
Gwinnett County Public Schools teachers enroll in traditional defined benefit plans under the Teachers Retirement System of Georgia and the supplemental Gwinnett Retirement System. In Gwinnett County, the crossover point occurs after 13 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is much shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and the *only* defined benefit plan in this study with a crossover point shorter than the career of the majority of American teachers.[1] The crossover point occurs much earlier than it does for teachers in the other districts in this study because of the supplemental Gwinnett Retirement System, which was established to provide Gwinnett County teachers with benefits similar to those they would receive from Social Security. Without the supplemental plan, the crossover point would occur at 20 years of service.

About the District	
Students	169,150
Teachers (FTE)	103,57

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	213,675
Total members	399,813

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes only membership in the state plan)

Figure 1: A new teacher in Gwinnett County must remain in the pension system for 13 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the two retirement systems after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the systems before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the systems up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Gwinnett County, a new teacher must stay 13 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the systems at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Gwinnett County teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed a total of $14,276 into the retirement systems.[6] (In reality, should this teacher separate from the systems before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (combined state and local plans) (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 14,276	-$ 14,276
38	13	$ 53,443	$ 51,961	$ 1,482
40	15	$ 74,725	$ 64,895	$ 9,830
50	25	$ 306,547	$ 156,211	$ 150,337

AT THE CROSSOVER

If she leaves the systems with at least **10 years** of service, she has now vested in both and is eligible to start receiving pension benefits once she reaches retirement age.[7] A few years later—after 13 years in the systems—a Gwinnett County teacher reaches the crossover point, meaning her benefits are worth more than contributions. At that point, she will have contributed a total of $51,961 into the systems and can expect lifetime pension wealth accrual worth $53,443. Her net benefit becomes positive, though small ($1,482).

MID-CAREER

Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $74,725, and at this point she has contributed a total of $64,895. Her pension wealth is worth nearly $10,000 more than her cumulative contributions. Gwinnett County is the *only* defined benefit plan in this study where the crossover point occurs prior to 15 years of service.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Gwinnett County teacher's net benefit is $150,337, but it takes her long time to reach that point. (Said another way, even after the crossover point in Figure 1, the red and green lines are still quite close together for a number of years.)

Bottom line: Teachers who start at age 25 under the Gwinnett County Public Schools salary schedule must wait 13 years to reach the crossover point. Teachers who exit the Georgia and Gwinnett County retirement systems early are financially disadvantaged compared to teachers who remain teaching under the same systems much longer—in this case, at least 13 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Gwinnett County Public Schools belong to traditional defined benefit pension plans in the Teachers Retirement System of Georgia (TRS) and the supplemental Gwinnett Retirement System (GRS).

Plan Provisions by the Numbers: Teachers Retirement System of Georgia (TRS)

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/10 and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/25

Employer and employee contributions

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: 14.27 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual TRS benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the two highest years of creditable earnings

Plan Provisions by the Numbers: Gwinnett Retirement System (GRS)

Retirement eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 65/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): the point at which the teacher becomes eligible to start receiving benefits under the TRS

Employer and employee contributions

- Employee contribution rate: 1 percent of salary
- Employer contribution rate: actuarially determined
- Refundable contributions: none

Defined benefit formula

- A teacher's supplemental retirement benefit is equal to a formula based on a applying a multiplier of 2.2 percent to the first $9,000 of earnings and 1.6 percent of earnings over $9,000.

Summary of Plan Provisions

A Gwinnett County teacher's total retirement benefits are a sum of her TRS and GRS benefits.

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Gwinnett County teacher qualifies for full TRS pension benefits at any age with 30 years of service, or at age 60 with ten years of service (whichever comes first). The annual TRS benefit is equal to a teacher's years of service, multiplied by her average salary of her final two years, times an accrual factor of 2.0 percent. A teacher vests into the TRS pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The TRS plan does offer reduced pension benefits for early retirement, available at any age with 25 years of service.

Under normal retirement eligibility requirements, a Gwinnett County teacher qualifies for full GRS pension benefits at age 65 with 10 years of service. The GRS benefit is equal to a formula based on a applying a multiplier of 2.2 percent to the first $9,000 of earnings and 1.6 percent of earnings over $9,000. A teacher vests into the GRS pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[11] The GRS plan does offer reduced pension benefits for early retirement, available at the earliest point at which a teacher is eligible for TRS benefits.

The employer contribution rate to the TRS plan is set at 14.27 percent of earnings, and to the GRS plan is 1 percent of earnings. The employee contribution rate to the TRS plan is set at 6 percent of earnings, and to the GRS plan is 1 percent of earnings.

Gwinnett County teachers do not pay into Social Security. In Georgia, it is up to the district whether teachers do or do not enroll; Gwinnett County opted out of Social Security and created the GRS to replace it.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[12]
- Survival probabilities from *2007 CDC Life Tables*[13]
- Teacher salary schedule for 2012–13 school year[14]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[15] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[16]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Gwinnett County Public Schools

Age	Years of Service	Value of teacher's TRS pension benefit (A1)	Value of teacher's cumulative TRS contributions to date (B1)	Value of teacher's GRS pension benefit (A2)	Value of teacher's cumulative GRS contributions to date (B2)	Total value of pension benefits A = (A1+A2)	Total value of cumulative contributions B = (B2 + B2)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,214	$ 0	$ 369	$ 0	$ 2,583	-$ 2,583
27	2	$ 0	$ 4,536	$ 0	$ 756	$ 0	$ 5,292	-$ 5,292
28	3	$ 0	$ 6,971	$ 0	$ 1,162	$ 0	$ 8,132	-$ 8,132
29	4	$ 0	$ 9,536	$ 0	$ 1,589	$ 0	$ 11,125	-$ 11,125
30	5	$ 0	$ 12,237	$ 0	$ 2,039	$ 0	$ 14,276	-$ 14,276
31	6	$ 0	$ 15,401	$ 0	$ 2,567	$ 0	$ 17,968	-$ 17,968
32	7	$ 0	$ 18,770	$ 0	$ 3,128	$ 0	$ 21,898	-$ 21,898
33	8	$ 0	$ 22,355	$ 0	$ 3,726	$ 0	$ 26,081	-$ 26,081
34	9	$ 0	$ 26,198	$ 0	$ 4,366	$ 0	$ 30,564	-$ 30,564
35	10	$ 17,647	$ 30,312	$ 12,134	$ 5,052	$ 29,781	$ 35,364	-$ 5,583
36	11	$ 21,575	$ 34,727	$ 14,835	$ 5,788	$ 36,410	$ 40,515	-$ 4,105
37	12	$ 26,208	$ 39,459	$ 18,021	$ 6,576	$ 44,229	$ 46,035	-$ 1,807
38	13	$ 31,668	$ 44,538	$ 21,775	$ 7,423	$ 53,443	$ 51,961	$ 1,482
39	14	$ 37,733	$ 49,923	$ 25,945	$ 8,320	$ 63,678	$ 58,243	$ 5,435
40	15	$ 44,279	$ 55,624	$ 30,446	$ 9,271	$ 74,725	$ 64,895	$ 9,830
41	16	$ 51,650	$ 61,653	$ 35,514	$ 10,275	$ 87,164	$ 71,928	$ 15,236
42	17	$ 60,024	$ 68,031	$ 41,272	$ 11,338	$ 101,296	$ 79,369	$ 21,927
43	18	$ 69,522	$ 74,771	$ 47,803	$ 12,462	$ 117,325	$ 87,233	$ 30,093
44	19	$ 80,295	$ 81,898	$ 55,211	$ 13,650	$ 135,506	$ 95,547	$ 39,959
45	20	$ 92,495	$ 89,425	$ 63,599	$ 14,904	$ 156,094	$ 104,329	$ 51,766
46	21	$ 106,312	$ 97,379	$ 73,100	$ 16,230	$ 179,411	$ 113,608	$ 65,803
47	22	$ 121,933	$ 105,775	$ 82,102	$ 17,629	$ 204,035	$ 123,404	$ 80,632
48	23	$ 139,600	$ 114,643	$ 92,082	$ 19,107	$ 231,682	$ 133,750	$ 97,932
49	24	$ 159,097	$ 123,978	$ 102,831	$ 20,663	$ 261,928	$ 144,641	$ 117,287
50	25	$ 190,899	$ 133,895	$ 115,649	$ 22,316	$ 306,547	$ 156,211	$ 150,337

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $14,276 (B). Her net pension wealth accrued at this point is -$14,276, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] There are no refunds for the GRS system.

[12] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[13] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[14] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[15] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[16] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

HAWAII STATE DEPARTMENT OF EDUCATION (HAWAII)

SUMMARY

A new Hawaii teacher enrolls in the Employees' Retirement System of the State of Hawaii: Hybrid Plan, which—despite the name—is a traditional defined benefit plan. In Hawaii, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

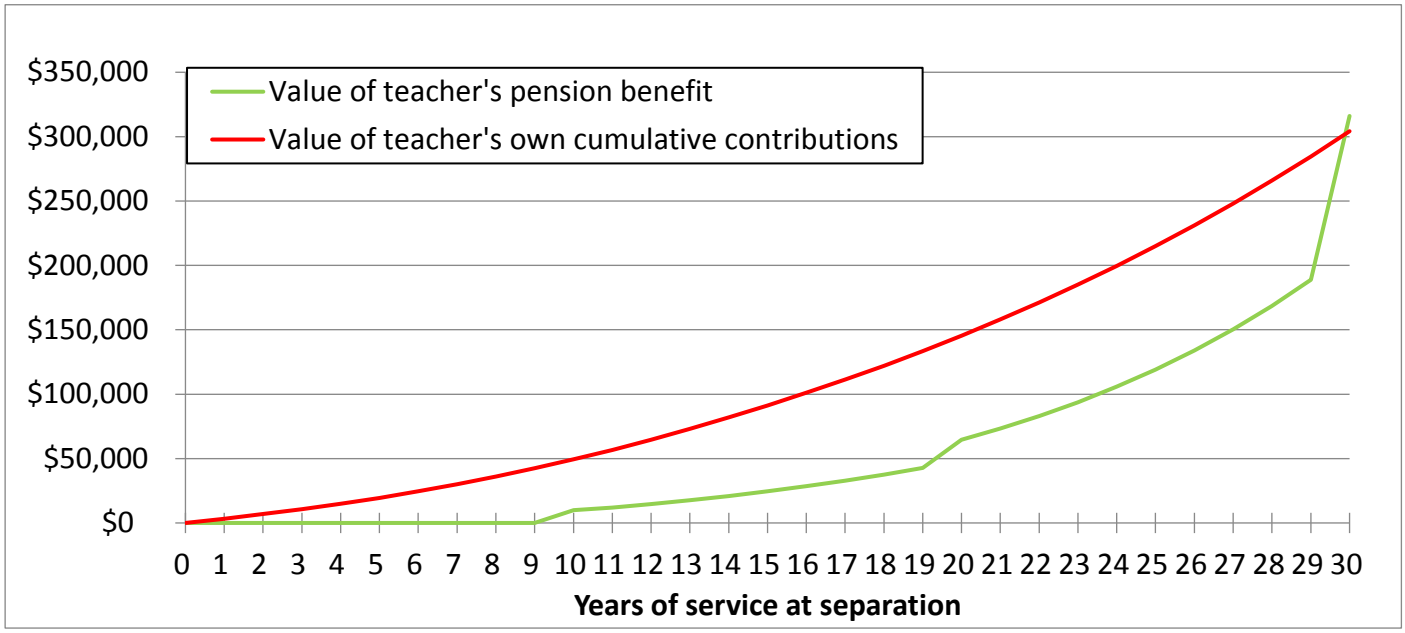
About the District	
Students	186,825
Teachers (FTE)	11,781

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	4,894
Total members	8,587

Note: Hawaii consists of a single "district," administered and operated by the state department of education

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in Hawaii must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Hawaii, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Hawaii teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $19,456 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 19,456	-$ 19,456
40	15	$ 24,610	$ 91,255	-$ 66,644
50	25	$ 119,038	$ 214,950	-$ 95,911
55	30	$ 316,052	$ 304,207	$ 11,845

MID-CAREER

If she leaves the system with at least **ten years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $24,610, but at this point she has contributed a total of $91,255. Not only has she not yet reached the crossover point, but her pension wealth is worth only 27 percent of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Hawaii teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is even larger than it was mid-career. At this point, she's contributed $214,950 but would only expect to receive $119,038 in benefits, a difference of nearly $96,000.

AT THE CROSSOVER

After 30 years, a Hawaii teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $304,207 into the system and can expect lifetime pension wealth accrual worth $316,052. Her net benefit becomes positive, though modest ($11,845).

Bottom line: Teachers who start at age 25 under the Hawaii salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Hawaii retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

Retirement System

Teachers working for the Hawaii State Department of Education belong to the Employees' Retirement System of the State of Hawaii: Hybrid Plan. Despite the name, this is a traditional defined benefit pension plan.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/30 and 65/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/20

Employer and employee contributions

- Employee contribution rate: 8.0 percent of salary
- Employer contribution rate: 16.5 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.75%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Hawaii teacher qualifies for full pension benefits at age 65 with 10 years of service, or age 60 with 30 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.75 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with 20 years of service.

The employer contribution rate is set at 16.5 percent of earnings. The employee contribution rate is set at 8.0 percent of earnings. Hawaii teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Hawaii State Department of Education

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,318	-$ 3,318
27	2	$ 0	$ 6,905	-$ 6,905
28	3	$ 0	$ 10,779	-$ 10,779
29	4	$ 0	$ 14,956	-$ 14,956
30	5	$ 0	$ 19,456	-$ 19,456
31	6	$ 0	$ 24,607	-$ 24,607
32	7	$ 0	$ 30,146	-$ 30,146
33	8	$ 0	$ 36,097	-$ 36,097
34	9	$ 0	$ 42,485	-$ 42,485
35	10	$ 9,830	$ 49,336	-$ 39,506
36	11	$ 12,011	$ 56,679	-$ 44,668
37	12	$ 14,650	$ 64,686	-$ 50,036
38	13	$ 17,623	$ 73,104	-$ 55,481
39	14	$ 20,941	$ 81,953	-$ 61,012
40	15	$ 24,610	$ 91,255	-$ 66,644
41	16	$ 28,632	$ 101,033	-$ 72,401
42	17	$ 32,829	$ 111,312	-$ 78,484
43	18	$ 37,515	$ 122,118	-$ 84,603
44	19	$ 42,746	$ 133,477	-$ 90,732
45	20	$ 64,727	$ 145,419	-$ 80,692
46	21	$ 73,390	$ 157,971	-$ 84,581
47	22	$ 83,041	$ 171,167	-$ 88,126
48	23	$ 93,784	$ 185,039	-$ 91,254
49	24	$ 105,740	$ 199,621	-$ 93,881
50	25	$ 119,038	$ 214,950	-$ 95,911
51	26	$ 133,827	$ 231,064	-$ 97,236
52	27	$ 150,270	$ 248,003	-$ 97,733
53	28	$ 168,547	$ 265,810	-$ 97,263
54	29	$ 188,859	$ 284,529	-$ 95,670
55	30	$ 316,052	$ 304,207	$ 11,845

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $19,456 (B). Her net pension wealth accrued at this point is -$19,456, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22; some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

JOINT SCHOOL DISTRICT NO. 2 ("WEST ADA SCHOOL DISTRICT") (IDAHO)

SUMMARY

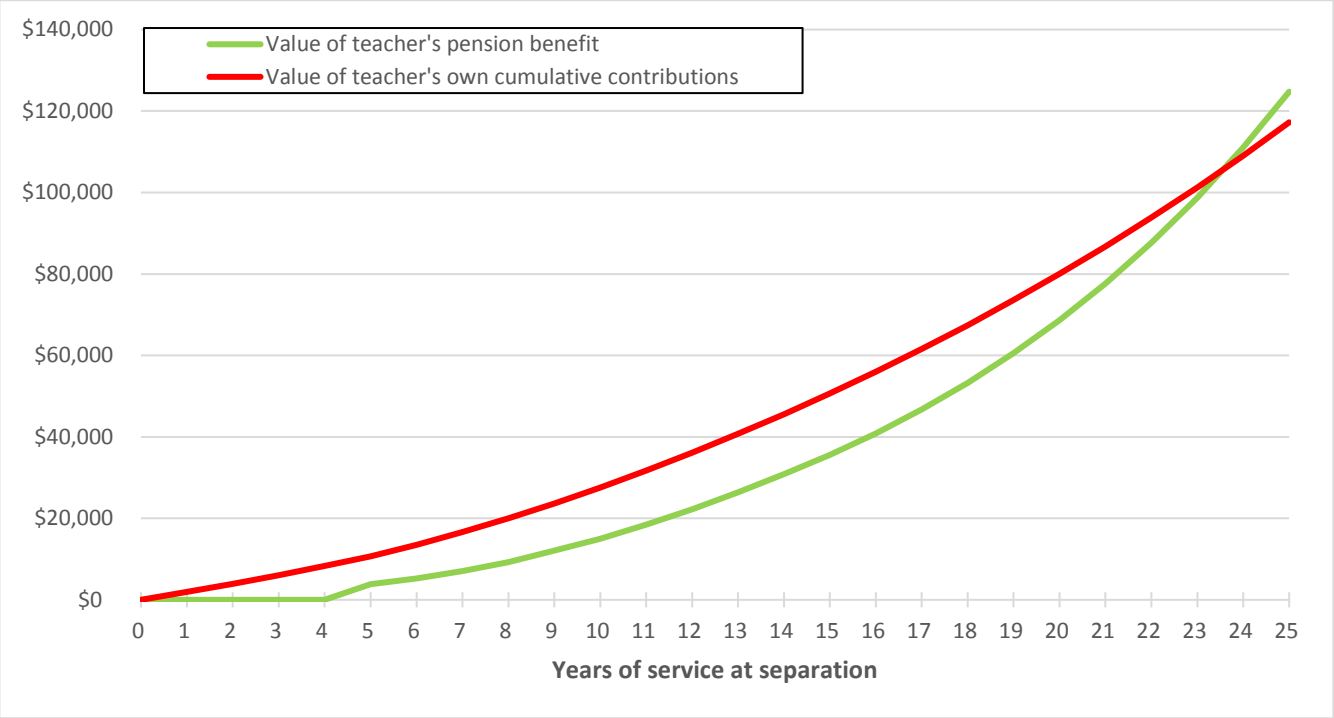
West Ada School District teachers enroll in a traditional defined benefit plan under the Public Employee Retirement System of Idaho. In West Ada, the crossover point occurs after 24 years of service, meaning that until that point the value of what that a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. While this is slightly shorter than the national median crossover point of 27 years for the defined benefit plans in this study, it is longer than the career of the majority of American teachers.[1]

About the District	
Students	38,006
Teachers (FTE)	1,775

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	65,270
Total members	113,243

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in the West Ada School District must remain in the pension system for 24 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In West Ada, a new teacher must stay 24 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A West Ada teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $6,076 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 6,076	-$ 6,076
40	15	$ 35,554	$ 50,664	-$ 15,109
49	24	$ 111,072	$ 109,061	$ 2,011
50	25	$ 124,751	$ 117,232	$ 7,519

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $35,554, but at this point she has contributed a total of $50,664. Not only has she not yet reached the crossover point, but her pension wealth is worth about $15,000 less than her cumulative contributions.

AT THE CROSSOVER

After 24 years, a West Ada teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $109,061 into the system and can expect lifetime pension wealth accrual worth $111,072. Her net benefit becomes positive, though small ($2,011).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a West Ada teacher's net benefit is larger than it was the year before, but still quite small ($7,519).

Bottom line: Idaho teachers who start at age 25 under the West Ada School District salary schedule must wait 24 years to reach the crossover point. Teachers who exit the Idaho retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 24 years.

Retirement System

Teachers working in the West Ada School District belong to a traditional defined benefit pension plan in the Public Employee Retirement System of Idaho.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 55/(Rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions

- Employee contribution rate: 6.79 percent of salary
- Employer contribution rate: 11.32 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the 42 highest months (3.5 years) of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a West Ada teacher qualifies for full pension benefits at age 65 with five years of service, or if the sum of her age and years of service equals 90 and she is older than age 55 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final 42 months, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service.

The employer contribution rate is set at 11.32 percent of earnings. The employee contribution rate is set at 6.79 percent of earnings. West Ada teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the West Ada School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,930	-$ 1,930
27	2	$ 0	$ 3,954	-$ 3,954
28	3	$ 0	$ 6,076	-$ 6,076
29	4	$ 0	$ 8,303	-$ 8,303
30	5	$ 3,857	$ 10,637	-$ 6,780
31	6	$ 5,275	$ 13,528	-$ 8,253
32	7	$ 7,057	$ 16,649	-$ 9,592
33	8	$ 9,296	$ 20,014	-$ 10,719
34	9	$ 12,102	$ 23,640	-$ 11,538
35	10	$ 15,009	$ 27,541	-$ 12,532
36	11	$ 18,430	$ 31,736	-$ 13,305
37	12	$ 22,224	$ 36,135	-$ 13,911
38	13	$ 26,369	$ 40,749	-$ 14,380
39	14	$ 30,830	$ 45,588	-$ 14,758
40	15	$ 35,554	$ 50,664	-$ 15,109
41	16	$ 40,825	$ 55,986	-$ 15,162
42	17	$ 46,699	$ 61,569	-$ 14,869
43	18	$ 53,242	$ 67,423	-$ 14,181
44	19	$ 60,525	$ 73,564	-$ 13,039
45	20	$ 68,626	$ 80,003	-$ 11,378
46	21	$ 77,631	$ 86,757	-$ 9,127
47	22	$ 87,635	$ 93,841	-$ 6,206
48	23	$ 98,743	$ 101,270	-$ 2,526
49	24	$ 111,072	$ 109,061	$ 2,011
50	25	$ 124,751	$ 117,232	$ 7,519

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,857 (A) and her cumulative contributions are worth $10,637 (B). Her net pension wealth accrued at this point is -$6,780, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html)

CHICAGO PUBLIC SCHOOLS (ILLINOIS)

SUMMARY

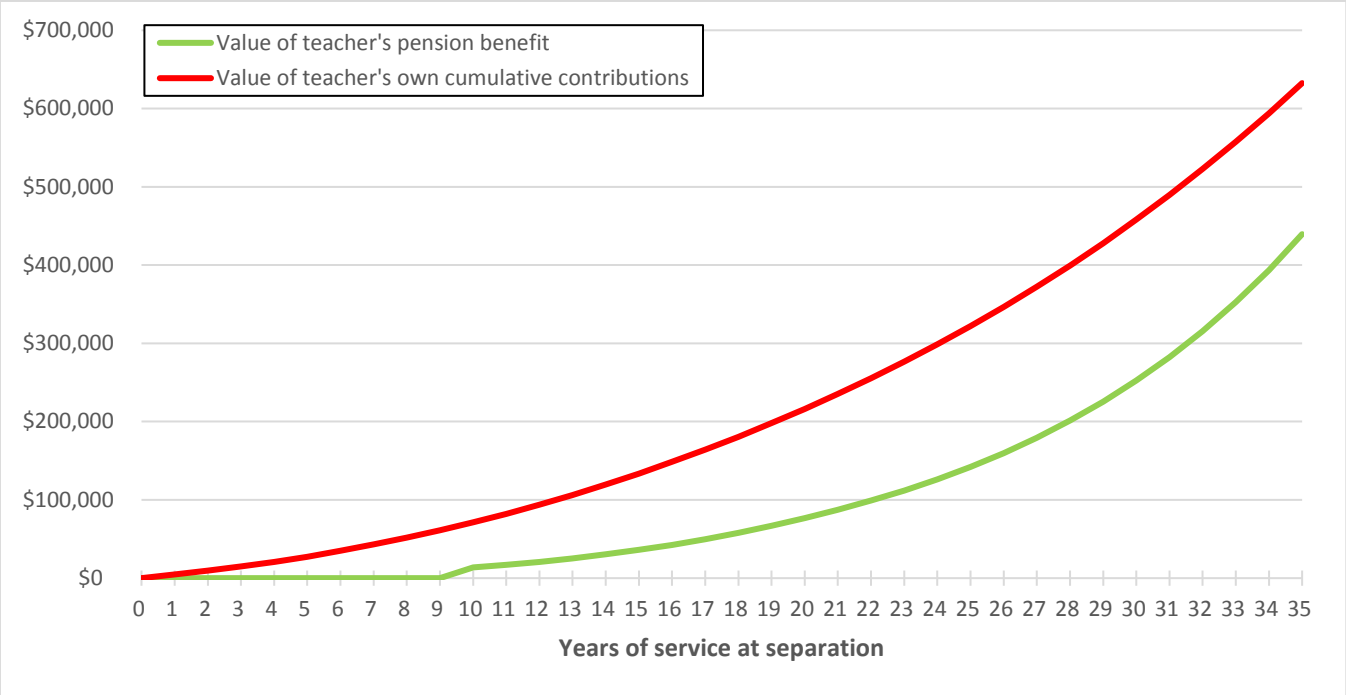
A new Chicago Public Schools teacher enrolls in a traditional defined benefit plan under the Chicago Teachers' Pension Fund. In Chicago, the crossover point never occurs, meaning that no matter how long a teacher stays, her retirement benefits will *always be worth less* than her contributions.

About the District	
Students	396,641
Teachers (FTE)	23,320

About the Retirement Plan	
Type	Defined benefit
Coverage	Local teachers
Active members	30,654
Total members	63,194

Sources: Enrollment: NCES (2013–14). Enrollment: NCES (2013–14). Retirement plan membership: Chicago Teachers' Pension Fund annual report (membership as of 2014)

Figure 1: No matter how long a new teacher in Chicago Public Schools remains in the pension system, she will never realize a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. (Should the green line be higher than the red, her benefits would be worth more than her contributions and her net benefit would be positive.) In Chicago, a new teacher never reaches the crossover point—the green line never crosses the red—and she will never receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[1] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[2] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[3] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[4] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Chicago teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed $27,375 into the retirement system.[5] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 27,375	-$ 27,375
40	15	$ 36,049	$ 133,647	-$ 97,598
50	25	$ 142,103	$ 322,038	-$ 179,935

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 67. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[6] Her pension wealth is $36,049, but at this point she has contributed a total of $133,647. Not only has she not yet reached the crossover point, but her pension wealth is worth only about one-quarter of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[7] But even after 25 years, a Chicago teacher still has not reached the crossover point. In fact, the difference between her contributions and pension wealth is even greater than it was mid-career. At this point, she's contributed $322,038 but would only expect to receive $142,103 in benefits. And because the crossover point in Chicago is infinite, no matter how many more years she stays, her benefits will *always* be worth less than her cumulative contributions (and her net benefit will *always* be negative).

Bottom line: Teachers who start at age 25 under the Chicago Public Schools salary schedule will never reach a crossover point. Teachers who exit the retirement system early, or even after a lengthy career, are financially disadvantaged as they will never see any net benefits from their contributions.

TECHNICAL MATTERS

Retirement System

Teachers working in Chicago belong to a traditional defined benefit pension plan in the Chicago Teachers' Pension Fund. (Illinois teachers who work in any district other than Chicago Public Schools have a separate pension system, with service credit and wage history reciprocity.)[8]

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 67/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): 62/10

Employer and employee contributions

- Employee contribution rate: 9 percent of salary
- Employer contribution rate: 26.21 percent of salary
- Refundable contributions: 8 percent of earnings with no interest (employee contribution less a 1 percent survivor benefit contribution)

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.2%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the eight highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, Chicago teachers qualify for full pension benefits at age 67 with 10 years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final eight years, times an accrual factor of 2.2 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at age 62 with 10 years of service.

The employer contribution rate is set at 26.21 percent of earnings. The employee contribution rate is set at 9 percent of earnings. Chicago Public Schools teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Chicago Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 4,574	-$ 4,574
27	2	$ 0	$ 9,470	-$ 9,470
28	3	$ 0	$ 14,873	-$ 14,873
29	4	$ 0	$ 20,818	-$ 20,818
30	5	$ 0	$ 27,375	-$ 27,375

31	6	$ 0	$ 34,867	-$ 34,867
32	7	$ 0	$ 42,993	-$ 42,993
33	8	$ 0	$ 51,733	-$ 51,733
34	9	$ 0	$ 61,159	-$ 61,159
35	10	$ 13,654	$ 71,292	-$ 57,637
36	11	$ 16,957	$ 82,163	-$ 65,206
37	12	$ 20,824	$ 93,814	-$ 72,990
38	13	$ 25,308	$ 106,274	-$ 80,966
39	14	$ 30,337	$ 119,572	-$ 89,235
40	15	$ 36,049	$ 133,647	-$ 97,598
41	16	$ 42,542	$ 148,540	-$ 105,998
42	17	$ 49,782	$ 164,196	-$ 114,414
43	18	$ 57,823	$ 180,653	-$ 122,830
44	19	$ 66,717	$ 197,954	-$ 131,236
45	20	$ 76,507	$ 216,140	-$ 139,634
46	21	$ 87,247	$ 235,259	-$ 148,012
47	22	$ 98,994	$ 255,356	-$ 156,362
48	23	$ 111,956	$ 276,483	-$ 164,527
49	24	$ 126,228	$ 298,692	-$ 172,464
50	25	$ 142,103	$ 322,038	-$ 179,935
51	26	$ 159,757	$ 346,580	-$ 186,823
52	27	$ 179,386	$ 372,380	-$ 192,994
53	28	$ 201,204	$ 399,500	-$ 198,296
54	29	$ 225,452	$ 428,010	-$ 202,559
55	30	$ 252,394	$ 457,980	-$ 205,587
56	31	$ 282,329	$ 489,485	-$ 207,156
57	32	$ 315,595	$ 522,604	-$ 207,009
58	33	$ 352,574	$ 557,419	-$ 204,845
59	34	$ 393,704	$ 594,017	-$ 200,313
60	35	$ 439,483	$ 632,490	-$ 193,008
61	36	$ 490,477	$ 672,934	-$ 182,457
62	37	$ 547,326	$ 715,449	-$ 168,122
63	38	$ 599,562	$ 760,141	-$ 160,579
64	39	$ 651,615	$ 807,123	-$ 155,508
65	40	$ 681,057	$ 856,511	-$ 175,454
66	41	$ 667,067	$ 908,429	-$ 241,362
67	42	$ 652,605	$ 963,005	-$ 310,401

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $27,375 (B). Her net pension wealth accrued at this point is -$27,375, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[2] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[3] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[4] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[5] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

6 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

7 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

8 http://www.ctpf.org/Brochures/sheet_leaving.pdf

9 A teacher who opts for a refund receives 8 percent of earnings with no interest (employee contribution less a 1 percent survivor benefit contribution). A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

10 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

11 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

12 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

13 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

14 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

DES MOINES PUBLIC SCHOOLS (IOWA)

SUMMARY

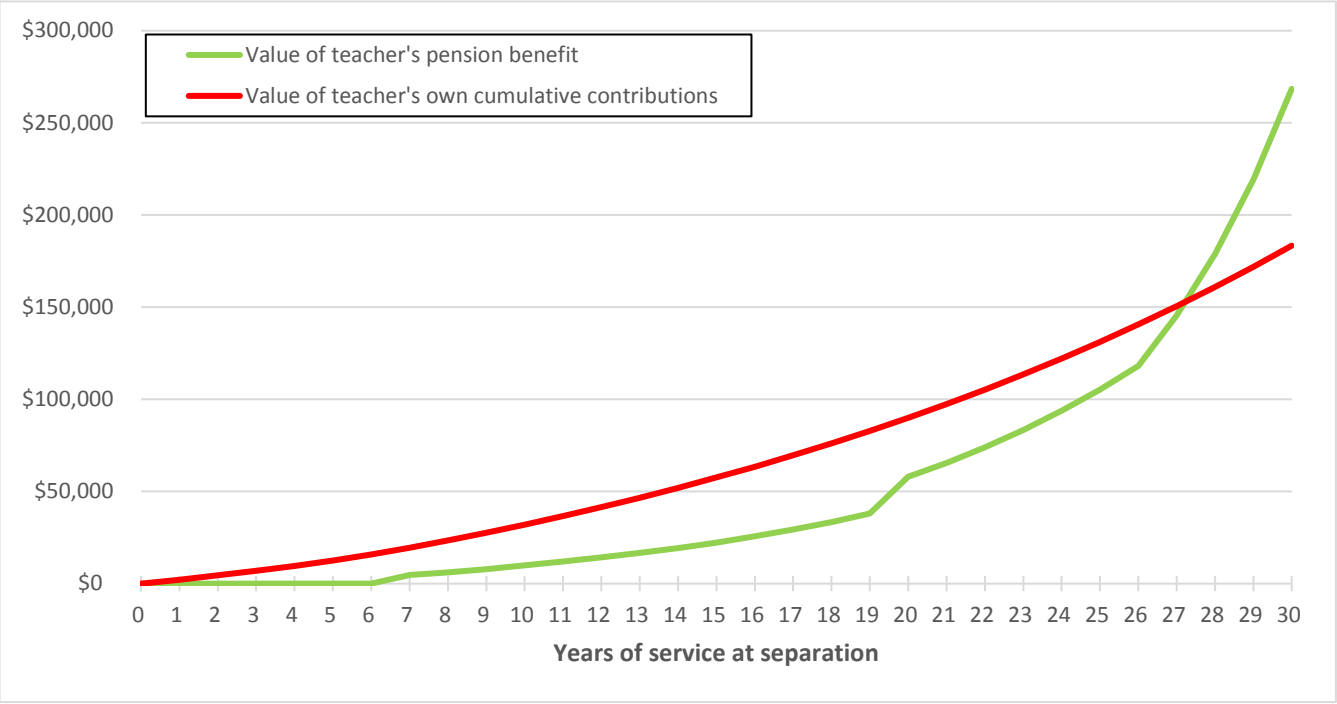
A new Des Moines Public Schools teacher enrolls in a traditional defined benefit plan under the Iowa Public Employees' Retirement System. In Des Moines, the crossover point occurs after 28 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	34,230
Teachers (FTE)	2,402

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	155,800
Total members	283,551

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all public employee members)

Figure 1: A new teacher in Des Moines Public Schools must remain in the pension system for 28 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Des Moines, a new teacher must stay 28 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Des Moines teacher who leaves after **five years** of service (or at any point before the vesting point of seven years) is not eligible to receive pension benefits at all, because she has not vested (Table 1).[6] Her pension wealth is zero, and after five years she has contributed $12,539 into the retirement system.[7] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 12,539	-$ 12,539
40	15	$ 22,330	$ 57,590	-$ 35,260
50	25	$ 105,307	$ 131,170	-$ 25,863
53	28	$ 178,903	$ 160,996	$ 17,906

MID-CAREER

If she leaves the system with at least **seven years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[8] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her pension wealth is $22,330, but at this point she has contributed a total of $57,590. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] But even after 25 years, a Des Moines teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is slightly smaller than it was mid-career. At this point, she's contributed $131,170 but would only expect to receive $105,307 in benefits.

AT THE CROSSOVER

After 28 years, a Des Moines teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $160,996 into the system and can expect lifetime pension wealth accrual worth $178,903. Her net benefit becomes positive, though modest ($17,906). The net benefit increases thereafter: after two more years it will be more than $85,000.

Bottom line: Iowa teachers who start at age 25 under the Des Moines Public Schools salary schedule must wait 28 years to reach the crossover point. Teachers who exit the Iowa retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 28 years.

Retirement System

Teachers working in Des Moines Public Schools belong to a traditional defined benefit pension plan in the Iowa Public Employees' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Seven years or age 65
- Normal retirement eligibility requirements (age/years of service):
  Lesser of 65/7, 62/20, and 55/(Rule of 88)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/any

Employer and employee contributions

- Employee contribution rate: 5.95 percent of salary
- Employer contribution rate: 8.93 percent of salary
- Refundable contributions: employee contributions plus interest; if vested, portion of employer contributions plus interest[11]

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS up to 30) x (FAS) + (1.0%) x (YOS 31-35) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Des Moines teacher qualifies for full pension benefits at age 65 with seven years of service, age 62 with 20 years of service, or age 55 as long as the sum of age and years of service is at least 88 (whichever comes first. If she has 30 years of service or less, the annual benefit is equal to a teacher's years of service up to 30, multiplied by the average salary of her final five years, times an accrual factor of 2.0 percent. If she has 31 to 35 years of service, she also receives a benefit equal to her years of service greater than 30, multiplied by the average salary of her final five years, times an accrual factor of 1.0 percent.[12] A teacher vests into the pension system after seven years—meaning after seven years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[13] The plan does offer reduced pension benefits for early retirement, available at age 55 with any years of service.

The employer contribution rate is set at 8.93 percent of earnings. The employee contribution rate is set at 5.95 percent of earnings. Des Moines teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[14]
- Survival probabilities from *2007 CDC Life Tables*[15]
- Teacher salary schedule for 2012–13 school year[16]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[17] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[18]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Des Moines Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,161	-$ 2,161
27	2	$ 0	$ 4,465	-$ 4,465
28	3	$ 0	$ 6,957	-$ 6,957
29	4	$ 0	$ 9,645	-$ 9,645
30	5	$ 0	$ 12,539	-$ 12,539
31	6	$ 0	$ 15,878	-$ 15,878
32	7	$ 4,762	$ 19,464	-$ 14,703
33	8	$ 6,185	$ 23,396	-$ 17,211
34	9	$ 7,892	$ 27,611	-$ 19,719
35	10	$ 9,861	$ 32,032	-$ 22,172
36	11	$ 11,939	$ 36,669	-$ 24,730
37	12	$ 14,250	$ 41,532	-$ 27,282
38	13	$ 16,707	$ 46,632	-$ 29,925
39	14	$ 19,363	$ 51,980	-$ 32,617
40	15	$ 22,330	$ 57,590	-$ 35,260
41	16	$ 25,641	$ 63,473	-$ 37,833
42	17	$ 29,330	$ 69,644	-$ 40,314
43	18	$ 33,440	$ 76,115	-$ 42,675
44	19	$ 38,014	$ 82,902	-$ 44,888
45	20	$ 57,929	$ 90,020	-$ 32,091
46	21	$ 65,531	$ 97,485	-$ 31,955
47	22	$ 73,976	$ 105,315	-$ 31,339
48	23	$ 83,353	$ 113,526	-$ 30,173
49	24	$ 93,760	$ 122,138	-$ 28,378
50	25	$ 105,307	$ 131,170	-$ 25,863
51	26	$ 118,115	$ 140,642	-$ 22,527
52	27	$ 145,551	$ 150,577	-$ 5,026
53	28	$ 178,903	$ 160,996	$ 17,906
54	29	$ 219,381	$ 171,924	$ 47,457
55	30	$ 268,438	$ 183,384	$ 85,054

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $12,539 (B). Her net pension wealth accrued at this point is -$12,539, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 Des Moines teachers vest after seven years of service or at age 65.

7 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

8 Retirement age depends on years of service; see the "Technical Matters" section for more.

9 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

10 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

11 Once vested, employees receive a percentage of the employer contributions equal to their years of service divided by 30. For example, an employee with 15 years of service would receive half of the contributions made by her employer (see Iowa Public Employees' Retirement System Member Handbook, https://www.ipers.org/sites/default/files/media/Member%20Handbook.pdf).

12 She cannot receive an annual benefit of greater than 65 percent of her final average salary, which is equivalent to a maximum of 35 years of applicable years of service. If she has more YOS, her benefit does not increase.

13 A teacher who opts for a refund receives the total of her employee contributions and a portion of the employer contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

14 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

15 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

16 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no.

2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

17 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

18 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

WICHITA PUBLIC SCHOOLS (KANSAS)

SUMMARY

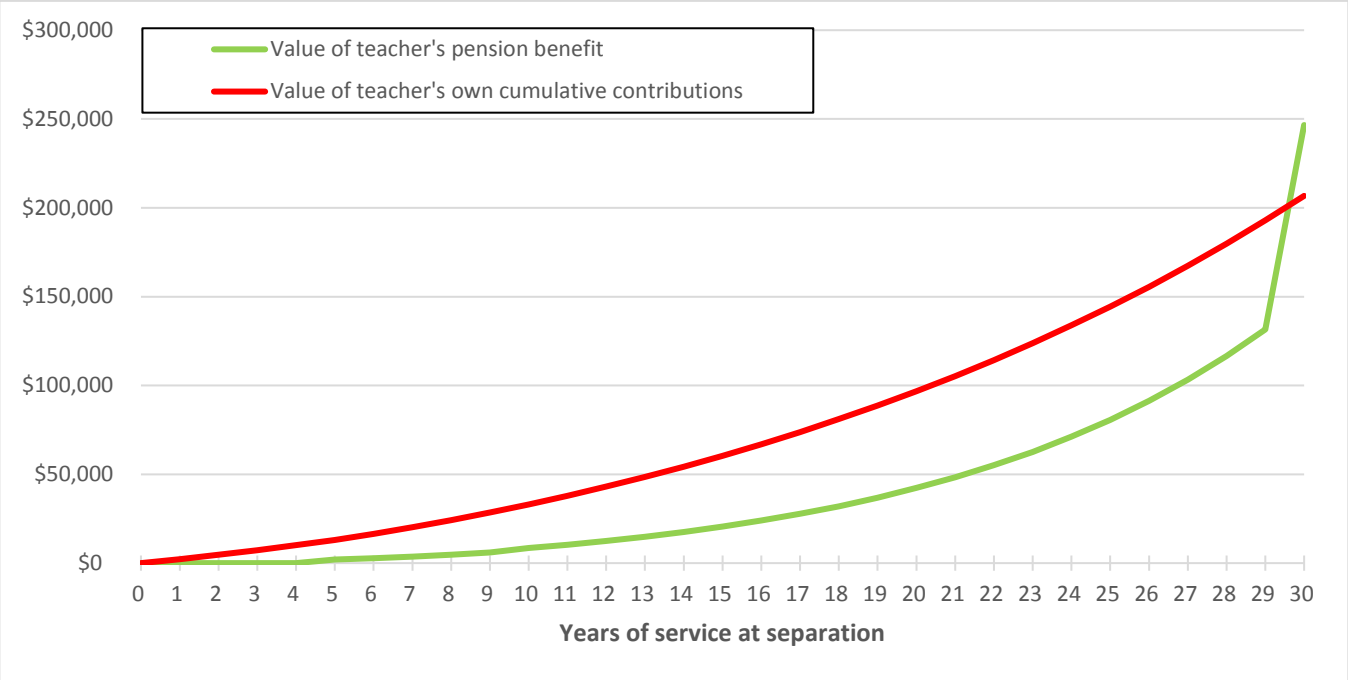
Our representative from the Wichita Public Schools teacher is enrolled in a traditional defined benefit plan under the School Tier 2 of the Kansas Public Employees Retirement System.[2] In Wichita, the crossover point for this teacher occurs after 30 years of service, meaning that until that point the value of what she would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[3]

About the District	
Students	50,629
Teachers (FTE)	3250

About the Retirement Plan[1]	
Type	Defined benefit
Coverage	Teachers
Active members	84,183
Total members	150,742

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of December, 2011; includes all members)

Figure 1: A representative teacher in Wichita Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 (and therefore enrolled in Tier 2), with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. This Wichita teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Wichita teacher hired at the start of the 2012–13 school year who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $7,273 into the retirement system.[8] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in this teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 7,273	-$ 7,273
40	15	$ 20,558	$ 60,417	-$ 39,859
50	25	$ 80,609	$ 144,412	-$ 63,803
55	30	$ 246,606	$ 206,737	$ 39,869

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[9] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[10] Her pension wealth is $20,558, but at this point she has contributed a total of $60,417. Not only has she not yet reached the crossover point, but her pension wealth is only about one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[11] But even after 25 years, this Wichita teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is even greater than it was mid-career. At this point, she's contributed $144,412 but would only expect to receive $80,609 in benefits.

AT THE CROSSOVER

After 30 years, this Wichita teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $206,737 into the system and can expect lifetime pension wealth accrual worth $246,606. Her net benefit becomes positive ($39,869).

Bottom line: Kansas teachers who start at age 25 under the Wichita Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Kansas retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Wichita Public Schools hired on or after July 1, 2009 and before January 1, 2015 belong to a traditional defined benefit pension plan in the School Tier 2 of the Kansas Public Employees Retirement System. (Teachers hired on or after Jan. 1, 2015 belong to School Tier 3, which is a cash balance plan.)

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 60/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/10

Employer and employee contributions

- Employee contribution rate: 6.0 percent of salary
- Employer contribution rate: 10.91 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.85%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Wichita teacher enrolled in School Tier 2 qualifies for full pension benefits at age 65 with five years of service or age 60 with 30 years of service, whichever comes first. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.85 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[12] The plan does offer reduced pension benefits for early retirement, available at age 55 with 10 years of service.

The employer contribution rate is set at 10.91 percent of earnings. The employee contribution rate is set at 6.0 percent of earnings. Wichita teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[13]
- Survival probabilities from *2007 CDC Life Tables*[14]
- Teacher salary schedule for 2012–13 school year[15]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[16] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[17]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Wichita Public Schools, first hired for the 2012–13 school year

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,247	-$ 2,247
27	2	$ 0	$ 4,668	-$ 4,668
28	3	$ 0	$ 7,273	-$ 7,273
29	4	$ 0	$ 10,071	-$ 10,071
30	5	$ 2,068	$ 13,074	-$ 11,007
31	6	$ 2,797	$ 16,519	-$ 13,722
32	7	$ 3,676	$ 20,219	-$ 16,544
33	8	$ 4,729	$ 24,190	-$ 19,462
34	9	$ 5,984	$ 28,445	-$ 22,461
35	10	$ 8,491	$ 33,000	-$ 24,509
36	11	$ 10,345	$ 37,870	-$ 27,525
37	12	$ 12,494	$ 43,073	-$ 30,579
38	13	$ 14,905	$ 48,555	-$ 33,650
39	14	$ 17,590	$ 54,331	-$ 36,741
40	15	$ 20,558	$ 60,417	-$ 39,859
41	16	$ 23,968	$ 66,925	-$ 42,958
42	17	$ 27,712	$ 73,782	-$ 46,070
43	18	$ 31,996	$ 81,039	-$ 49,043
44	19	$ 36,824	$ 88,685	-$ 51,861
45	20	$ 42,347	$ 96,774	-$ 54,427
46	21	$ 48,312	$ 105,296	-$ 56,984
47	22	$ 55,107	$ 114,307	-$ 59,200
48	23	$ 62,619	$ 123,801	-$ 61,183
49	24	$ 71,169	$ 133,837	-$ 62,669
50	25	$ 80,609	$ 144,412	-$ 63,803
51	26	$ 91,347	$ 155,585	-$ 64,238
52	27	$ 103,193	$ 167,358	-$ 64,165
53	28	$ 116,662	$ 179,794	-$ 63,133
54	29	$ 131,510	$ 192,898	-$ 61,388
55	30	$ 246,606	$ 206,737	$ 39,869

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,068 (A) and her cumulative contributions are worth $13,074 (B). Her net pension wealth accrued at this point is -$11,007, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] Kansas teachers hired on or after July 1, 2009 and before January 1, 2015 belong to School Tier 2, a traditional defined benefit plan. Our representative teacher was hired in 2012, so she would be enrolled in this plan.

[2] Teachers hired on or after January 1, 2015 belong to School Tier 3, a cash balance plan, which is a defined benefit plan under which benefits are promised in terms of a total account balance, not an annual benefit.

[3] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

9 Retirement age depends on years of service; see the "Technical Matters" section for more.

10 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

11 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

12 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

13 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

14 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

15 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

16 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[17] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

JEFFERSON COUNTY PUBLIC SCHOOLS (KENTUCKY)

SUMMARY

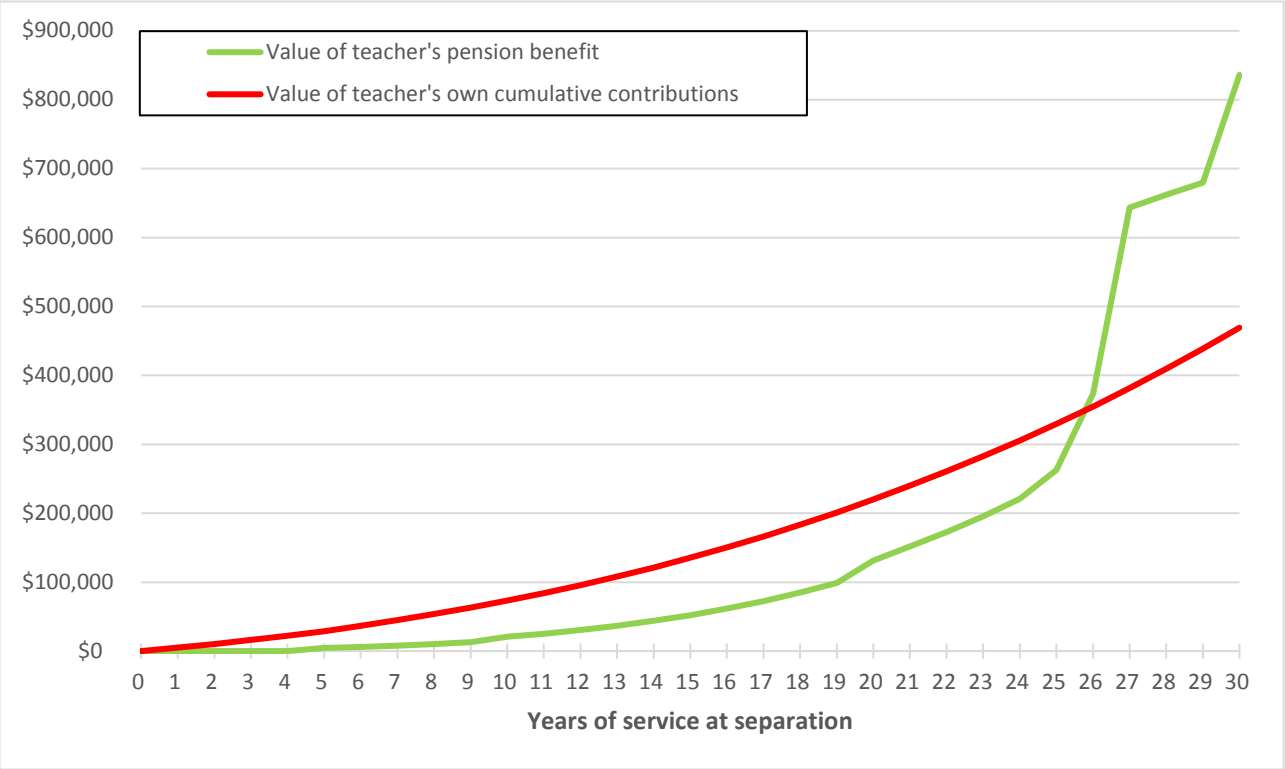
A new Jefferson County Public Schools teacher enrolls in a traditional defined benefit plan under the Kentucky Teachers' Retirement System. In Jefferson County, the crossover point occurs after 26 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is just one year shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	100,529
Teachers (FTE)	5,853

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	75,951
Total members	128,703

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Jefferson County Public Schools must remain in the pension system for 26 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Jefferson County, a new teacher must stay 26 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Jefferson County teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $16,124 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 16,124	-$ 16,124
40	15	$ 52,200	$ 135,358	-$ 83,158
50	25	$ 262,548	$ 329,507	-$ 66,958
51	26	$ 373,891	$ 354,854	$ 19,036

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $52,200, but at this point she has contributed a total of $135,358. Not only has she not yet reached the crossover point, but her pension wealth is worth $83,158 less than her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Jefferson County teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $329,507 but would only expect to receive $262,548 in benefits.

AT THE CROSSOVER

After 26 years, a Jefferson County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $354,854 into the system and can expect lifetime pension wealth accrual worth $373,891. Her net benefit becomes positive, and, though it is still modest ($19,036), it represents a change in net benefit compared to the year before. (The jump in benefits between 25 and 26 years of service is because, after 26 years, the multiplier in the annual benefit formula increases. It also increases after 30 years, which accounts for the rapid jump in benefits (green line) in Figure 1 at this point. See "Technical Matters" for details.)

Bottom line: Kentucky teachers who start at age 25 under the Jefferson County Public Schools salary schedule must wait 26 years to reach the crossover point. Teachers who exit the Kentucky retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 26 years.

Retirement System

Teachers working in Jefferson County Public Schools belong to a traditional defined benefit pension plan in the Kentucky Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of any/27 and 60/5
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/10

Employer and employee contributions

- Employee contribution rate: 12.86 percent of salary
- Employer contribution rate: 29.83 percent of salary
- Refundable contributions: employee contributions plus interest, minus any statutory required contributions to the medical insurance fund

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (MULTIPLIER) x (YOS) x (FAS)

Where the MULTIPLIER varies according to years of service at retirement:

Years of Service	Multiplier
0.00–10.00	1.7%
10.01–20.00	2.0%
20.01–26.00	2.3%
26.01–30.00	2.5%
30.01 or more	3.0%

When a teacher is eligible for a new multiplier, all prior years convert to the new multiplier until 30 years of service. At that point, only the years of service greater than 30 will use the multiplier of 3 percent.[10]

YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings (or the average of the three highest years if the retiree is age 55 with 27 years of service).

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Jefferson County teacher qualifies for full pension benefits at age 60 with five years of service or at any age with 27 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years (unless she is age 55 to 60 with 27 years, in which case it is her final three years), times an accrual factor that varies depending on her years of service. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[11] The plan does offer reduced pension benefits for early retirement, available at age 55 with 10 years of service.

The employer contribution rate is set at 29.83 percent of earnings. The employee contribution rate is set at 12.86 percent of earnings. Jefferson County teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[12]
- Survival probabilities from *2007 CDC Life Tables*[13]
- Teacher salary schedule for 2012–13 school year[14]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[15] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[16]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Jefferson County Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 5,031	-$ 5,031
27	2	$ 0	$ 10,401	-$ 10,401
28	3	$ 0	$ 16,124	-$ 16,124
29	4	$ 0	$ 22,218	-$ 22,218
30	5	$ 4,416	$ 28,934	-$ 24,518
31	6	$ 5,977	$ 36,622	-$ 30,645
32	7	$ 7,869	$ 44,869	-$ 37,000
33	8	$ 10,152	$ 53,704	-$ 43,552
34	9	$ 12,895	$ 63,154	-$ 50,259
35	10	$ 20,768	$ 73,249	-$ 52,481
36	11	$ 25,262	$ 84,021	-$ 58,760
37	12	$ 30,621	$ 95,688	-$ 65,067
38	13	$ 36,822	$ 108,108	-$ 71,286
39	14	$ 43,973	$ 121,318	-$ 77,345
40	15	$ 52,200	$ 135,358	-$ 83,158
41	16	$ 61,642	$ 150,266	-$ 88,625
42	17	$ 72,493	$ 166,272	-$ 93,779
43	18	$ 85,093	$ 183,333	-$ 98,241
44	19	$ 99,049	$ 201,227	-$ 102,178
45	20	$ 131,584	$ 219,994	-$ 88,410
46	21	$ 151,613	$ 239,862	-$ 88,249
47	22	$ 172,882	$ 260,698	-$ 87,816
48	23	$ 195,594	$ 282,551	-$ 86,957
49	24	$ 220,891	$ 305,470	-$ 84,579
50	25	$ 262,548	$ 329,507	-$ 66,958
51	26	$ 373,891	$ 354,854	$ 19,036
52	27	$ 643,708	$ 381,438	$ 262,269
53	28	$ 662,197	$ 409,319	$ 252,878
54	29	$ 679,885	$ 438,560	$ 241,325
55	30	$ 836,051	$ 469,228	$ 366,823

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,416 (A) and her cumulative contributions are worth $28,934 (B). Her net pension wealth accrued at this point is -$24,518, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] For example, if a teacher retired with 26 YOS, her annual benefit is equal to (2.5% x 26 years x FAS). If she retired with 32 YOS, her annual benefit is equal to (2.5% x 30 years x FAS) + (3.0% x 2 years x FAS).

[11] A teacher who opts for a refund receives the total of her employee contributions, plus interest, minus any statutory required contributions to the medical insurance fund. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits. (See https://trs.ky.gov/active-members/events-affecting-pension/termination-of-employment/.)

[12] According to the *Beginning Teacher Longitudinal Study*, 80 percent of beginning teachers had a bachelor's degree See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[13] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[14] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[15] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[16] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

JEFFERSON PARISH PUBLIC SCHOOL SYSTEM (LOUISIANA)

SUMMARY

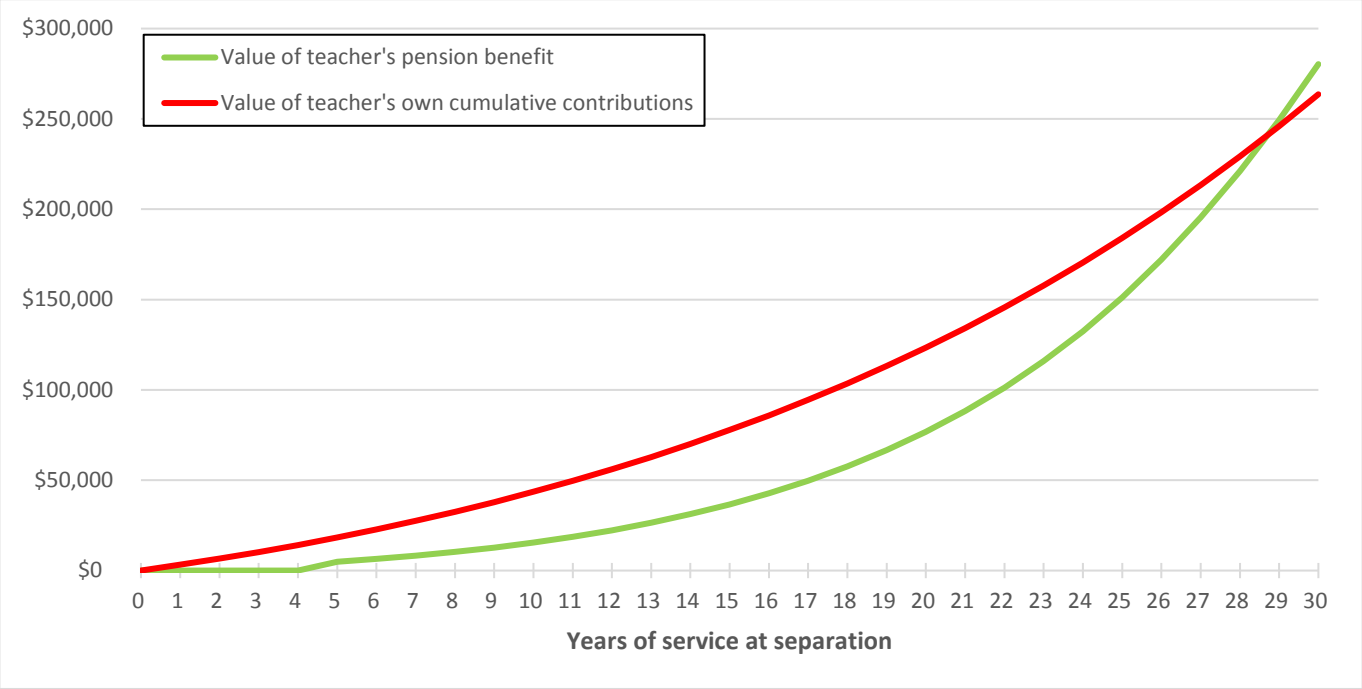
Jefferson Parish Public School System teachers enroll in a traditional defined benefit plan under the Teacher's Retirement System of Louisiana. In Jefferson Parish, the crossover point occurs after 29 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	46,312
Teachers (FTE)	2,945

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	84,513
Total members	179,315

Sources: Enrollment: NCES (2013–14). Retirement plan membership: ***Urban Institute*** ***(membership as of June, 2012)***

Figure 1: A new teacher in the Jefferson Parish Public School System must remain in the pension system for 29 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Jefferson Parish, a new teacher must stay 29 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Jefferson Parish teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $10,255 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 10,255	-$ 10,255
40	15	$ 36,612	$ 77,763	-$ 41,151
50	25	$ 151,116	$ 184,069	-$ 32,953
54	29	$ 249,300	$ 245,998	$ 3,302

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 60. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $36,612, but at this point she has contributed a total of $77,763. Not only has she not yet reached the crossover point, but her pension wealth is not even half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Jefferson Parish teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is slightly smaller than it was mid-career. At this point, she's contributed $184,069 but would only expect to receive $151,116 in benefits.

AT THE CROSSOVER

After 29 years, a Jefferson Parish teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $245,998 into the system and can expect lifetime pension wealth accrual worth $249,300. Her net benefit becomes positive, though modest ($3,302). The net benefit increases thereafter—after only one more year it will be nearly $17,000.

Bottom line: Louisiana teachers who start at age 25 under the Jefferson Parish Public School System salary schedule must wait 29 years to reach the crossover point. Teachers who exit the Louisiana retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 29 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Jefferson Parish Public School System belong to a traditional defined benefit pension plan in the Teacher's Retirement System of Louisiana.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): 60/5
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/20

Employer and employee contributions

- Employee contribution rate: 8.0 percent of salary
- Employer contribution rate: 26.30 percent of salary
- Refundable contributions: employee contributions without interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Jefferson Parish teacher qualifies for full pension benefits at age 60 with five years of service. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.5 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at any age with 20 years of service.

The employer contribution rate is set at 26.3 percent of earnings. The employee contribution rate is set at 8.0 percent of earnings. Jefferson Parish teachers do not pay into Social Security.

Assumptions for computing pension wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Jefferson Parish Public School System

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,196	-$ 3,196
27	2	$ 0	$ 6,610	-$ 6,610
28	3	$ 0	$ 10,255	-$ 10,255
29	4	$ 0	$ 14,142	-$ 14,142
30	5	$ 4,845	$ 18,284	-$ 13,439
31	6	$ 6,391	$ 22,742	-$ 16,351
32	7	$ 8,194	$ 27,486	-$ 19,292
33	8	$ 10,288	$ 32,531	-$ 22,244
34	9	$ 12,711	$ 37,894	-$ 25,183
35	10	$ 15,508	$ 43,592	-$ 28,084
36	11	$ 18,681	$ 49,642	-$ 30,961
37	12	$ 22,316	$ 56,064	-$ 33,748
38	13	$ 26,471	$ 62,877	-$ 36,406
39	14	$ 31,212	$ 70,103	-$ 38,891
40	15	$ 36,612	$ 77,763	-$ 41,151
41	16	$ 42,754	$ 85,881	-$ 43,127
42	17	$ 49,731	$ 94,481	-$ 44,750
43	18	$ 57,646	$ 103,590	-$ 45,944
44	19	$ 66,617	$ 113,234	-$ 46,617
45	20	$ 76,774	$ 123,442	-$ 46,669
46	21	$ 88,263	$ 134,246	-$ 45,983
47	22	$ 101,247	$ 145,675	-$ 44,428
48	23	$ 115,910	$ 157,765	-$ 41,855
49	24	$ 132,456	$ 170,550	-$ 38,095
50	25	$ 151,116	$ 184,069	-$ 32,953
51	26	$ 172,149	$ 198,359	-$ 26,210
52	27	$ 195,407	$ 213,416	-$ 18,009
53	28	$ 221,063	$ 229,282	-$ 8,218
54	29	$ 249,300	$ 245,998	$ 3,302
55	30	$ 280,305	$ 263,612	$ 16,693

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,845 (A) and her cumulative contributions are worth $18,284 (B). Her net pension wealth accrued at this point is -$13,439, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 A teacher who opts for a refund receives the total of her employee contributions, without interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

10 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

11 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

12 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

13 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

14 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

PORTLAND PUBLIC SCHOOLS (MAINE)

SUMMARY

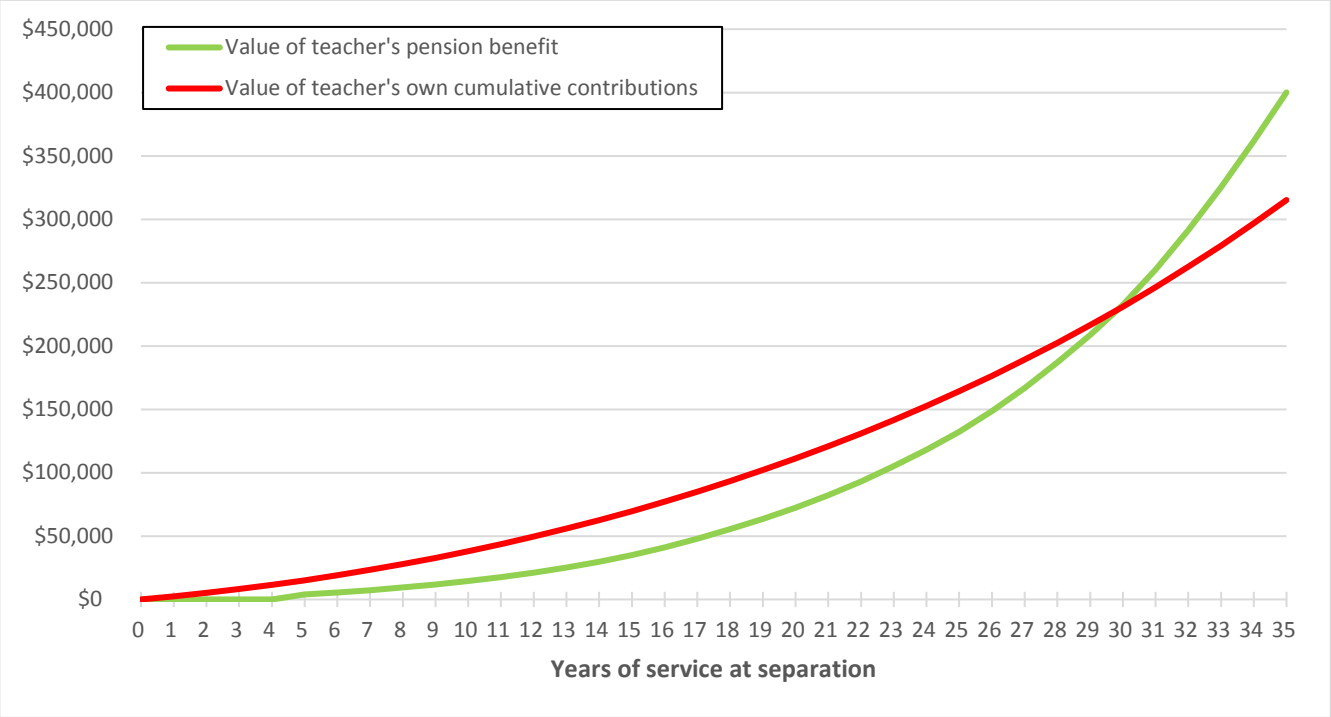
Portland Public Schools teachers enroll in a traditional defined benefit plan under the Maine Public Employees Retirement System: State and Teacher's Retirement Program. In Portland, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	7,006
Teachers (FTE)	587

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	51,145
Total members	146,438

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Maine PERS Comprehensive Annual Financial Report (membership as of June, 2015; includes all members)

Figure 1: A new teacher in Portland Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Portland, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Portland teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $8,258 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 8,258	-$ 8,258
40	15	$ 35,075	$ 69,624	-$ 34,549
50	25	$ 132,274	$ 164,288	-$ 32,014
55	30	$ 232,589	$ 231,059	$ 1,530

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 65. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $35,075, but at this point she has contributed a total of $69,624. Not only has she not yet reached the crossover point, but her pension wealth is worth almost $35,000 less than her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Portland teacher still has not reached the crossover point, and the difference between her contributions and her pension wealth is still about the same as it was mid-career. At this point, she's contributed $164,288 but would only expect to receive $132,274 in benefits.

AT THE CROSSOVER

After 30 years, a Portland teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $231,059 into the system and can expect lifetime pension wealth accrual worth $232,589. Her net benefit becomes positive, though modest ($1,530). The net benefit increases thereafter—after only one more year it will be nearly $14,000, and it will more than double to about $29,000 the year after that (Table 2).

Bottom line: Maine teachers who start at age 25 under the Portland Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Maine retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

Retirement System

Teachers working in Portland Public Schools belong to a traditional defined benefit pension plan in the Maine Public Employees Retirement System: State and Teacher's Retirement Program.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): 65/5
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/25

Employer and employee contributions

- Employee contribution rate: 7.65 percent of salary
- Employer contribution rate: 12.89 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Portland teacher qualifies for full pension benefits at age 65 with five years of service. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at any age with 25 years of service.

The employer contribution rate is set at 12.89 percent of earnings. The employee contribution rate is set at 7.65 percent of earnings.

Portland teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Portland Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,513	-$ 2,513
27	2	$ 0	$ 5,262	-$ 5,262
28	3	$ 0	$ 8,258	-$ 8,258
29	4	$ 0	$ 11,512	-$ 11,512
30	5	$ 4,032	$ 15,014	-$ 10,981
31	6	$ 5,544	$ 19,036	-$ 13,492
32	7	$ 7,357	$ 23,340	-$ 15,983
33	8	$ 9,529	$ 27,940	-$ 18,411
34	9	$ 11,828	$ 32,849	-$ 21,021
35	10	$ 14,490	$ 38,080	-$ 23,590
36	11	$ 17,563	$ 43,650	-$ 26,087
37	12	$ 21,099	$ 49,574	-$ 28,475
38	13	$ 25,157	$ 55,868	-$ 30,711
39	14	$ 29,803	$ 62,549	-$ 32,746
40	15	$ 35,075	$ 69,624	-$ 34,549
41	16	$ 41,042	$ 77,111	-$ 36,068
42	17	$ 47,778	$ 85,028	-$ 37,249
43	18	$ 55,414	$ 93,395	-$ 37,981
44	19	$ 63,645	$ 102,151	-$ 38,506
45	20	$ 72,441	$ 111,312	-$ 38,871
46	21	$ 82,209	$ 120,970	-$ 38,761
47	22	$ 93,085	$ 131,075	-$ 37,990
48	23	$ 105,186	$ 141,648	-$ 36,463
49	24	$ 118,044	$ 152,712	-$ 34,668
50	25	$ 132,274	$ 164,288	-$ 32,014
51	26	$ 148,690	$ 176,460	-$ 27,771
52	27	$ 166,917	$ 189,197	-$ 22,280
53	28	$ 187,149	$ 202,524	-$ 15,375
54	29	$ 208,729	$ 216,468	-$ 7,739
55	30	$ 232,589	$ 231,059	$ 1,530
56	31	$ 260,361	$ 246,397	$ 13,964
57	32	$ 291,200	$ 262,447	$ 28,753
58	33	$ 325,451	$ 279,240	$ 46,212
59	34	$ 361,731	$ 296,811	$ 64,921
60	35	$ 400,119	$ 315,196	$ 84,922

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,032 (A) and her cumulative contributions are worth $15,014 (B). Her net pension wealth accrued at this point is -$10,981, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

10 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. (See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

11 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

12 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

13 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

14 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

MONTGOMERY COUNTY PUBLIC SCHOOLS (MARYLAND)

SUMMARY

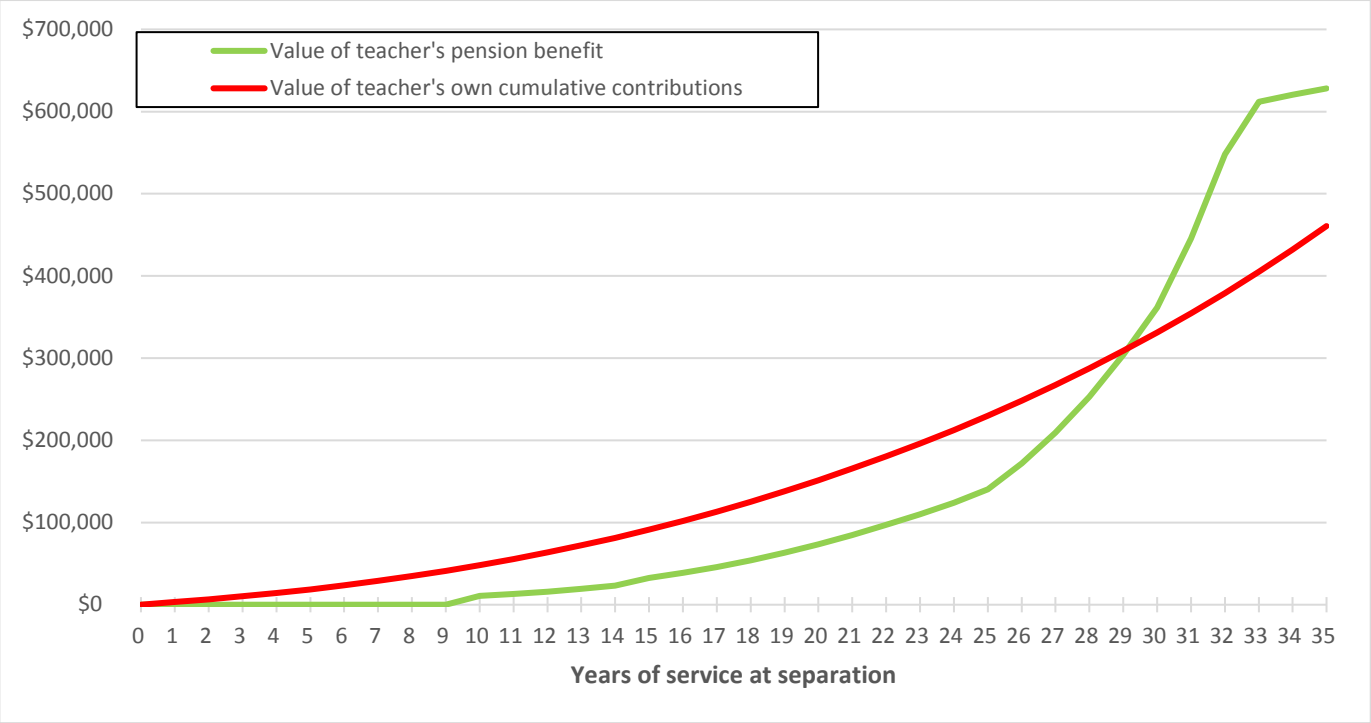
A new Montgomery County teacher enrolls in a traditional defined benefit plan under the Maryland State Retirement and Pension System: Teachers' Retirement and Pension System. In Montgomery County, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	151,295
Teachers (FTE)	10,112

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	103,694
Total members	190,426

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Montgomery County Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Montgomery County, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Montgomery County teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $18,360 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 18,360	-$ 18,360
40	15	$ 32,508	$ 91,258	-$ 58,750
50	25	$ 140,356	$ 229,895	-$ 89,539
55	30	$ 361,592	$ 331,079	$ 30,513

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $32,508, but at this point she has contributed a total of $91,258. Not only has she not yet reached the crossover point, but her pension wealth is worth only about one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Montgomery County teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is even greater than was mid-career. At this point, she's contributed $229,895 but would only expect to receive $140,356 in benefits.

AT THE CROSSOVER

After 30 years, a Montgomery County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $331,079 into the system and can expect lifetime pension wealth accrual worth $361,592. Her net benefit becomes positive ($30,513), and quickly increases every year thereafter.

Bottom line: Maryland teachers who start at age 25 under the Montgomery County Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Maryland retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

Retirement System

Teachers working in Montgomery County Public Schools belong to a traditional defined benefit pension plan in the Maryland State Retirement and Pension System: Teachers' Retirement and Pension System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/10 and Rule of 90
- Early retirement eligibility requirements for reduced benefits (age/years of service): 60/15

Employer and employee contributions

- Employee contribution rate: 7.0 percent of salary
- Employer contribution rate: 16.15 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Montgomery County teacher qualifies for full pension benefits at age 65 with 10 years of service, or as the sum of age and years of service is 90 or more (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.5 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 60 with 15 years of service.

The employer contribution rate is set at 16.15 percent of earnings. The employee contribution rate is set at 7.0 percent of earnings. Montgomery County teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Montgomery County Public Schools

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,169	-$ 3,169
27	2	$ 0	$ 6,549	-$ 6,549
28	3	$ 0	$ 10,196	-$ 10,196
29	4	$ 0	$ 14,127	-$ 14,127
30	5	$ 0	$ 18,360	-$ 18,360
31	6	$ 0	$ 23,421	-$ 23,421
32	7	$ 0	$ 28,898	-$ 28,898
33	8	$ 0	$ 34,817	-$ 34,817
34	9	$ 0	$ 41,209	-$ 41,209
35	10	$ 10,580	$ 48,102	-$ 37,522
36	11	$ 13,028	$ 55,531	-$ 42,502
37	12	$ 15,912	$ 63,528	-$ 47,616
38	13	$ 19,300	$ 72,130	-$ 52,830
39	14	$ 23,273	$ 81,376	-$ 58,103
40	15	$ 32,508	$ 91,258	-$ 58,750
41	16	$ 38,697	$ 101,815	-$ 63,117
42	17	$ 45,816	$ 113,084	-$ 67,268
43	18	$ 53,981	$ 125,109	-$ 71,128
44	19	$ 63,324	$ 137,932	-$ 74,609
45	20	$ 73,611	$ 151,406	-$ 77,795
46	21	$ 84,854	$ 165,564	-$ 80,710
47	22	$ 97,047	$ 180,439	-$ 83,393
48	23	$ 110,162	$ 196,070	-$ 85,908
49	24	$ 124,148	$ 212,493	-$ 88,345
50	25	$ 140,356	$ 229,895	-$ 89,539
51	26	$ 172,025	$ 248,180	-$ 76,155
52	27	$ 209,243	$ 267,393	-$ 58,150
53	28	$ 252,838	$ 287,580	-$ 34,742
54	29	$ 303,755	$ 308,792	-$ 5,037
55	30	$ 361,592	$ 331,079	$ 30,513
56	31	$ 445,652	$ 354,498	$ 91,155
57	32	$ 548,137	$ 379,104	$ 169,033
58	33	$ 612,080	$ 404,959	$ 207,121
59	34	$ 620,592	$ 432,125	$ 188,467
60	35	$ 628,167	$ 460,670	$ 167,497

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $18,360 (B). Her net pension wealth accrued at this point is -$18,360, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

BOSTON PUBLIC SCHOOLS (MASSACHUSETTS)

SUMMARY

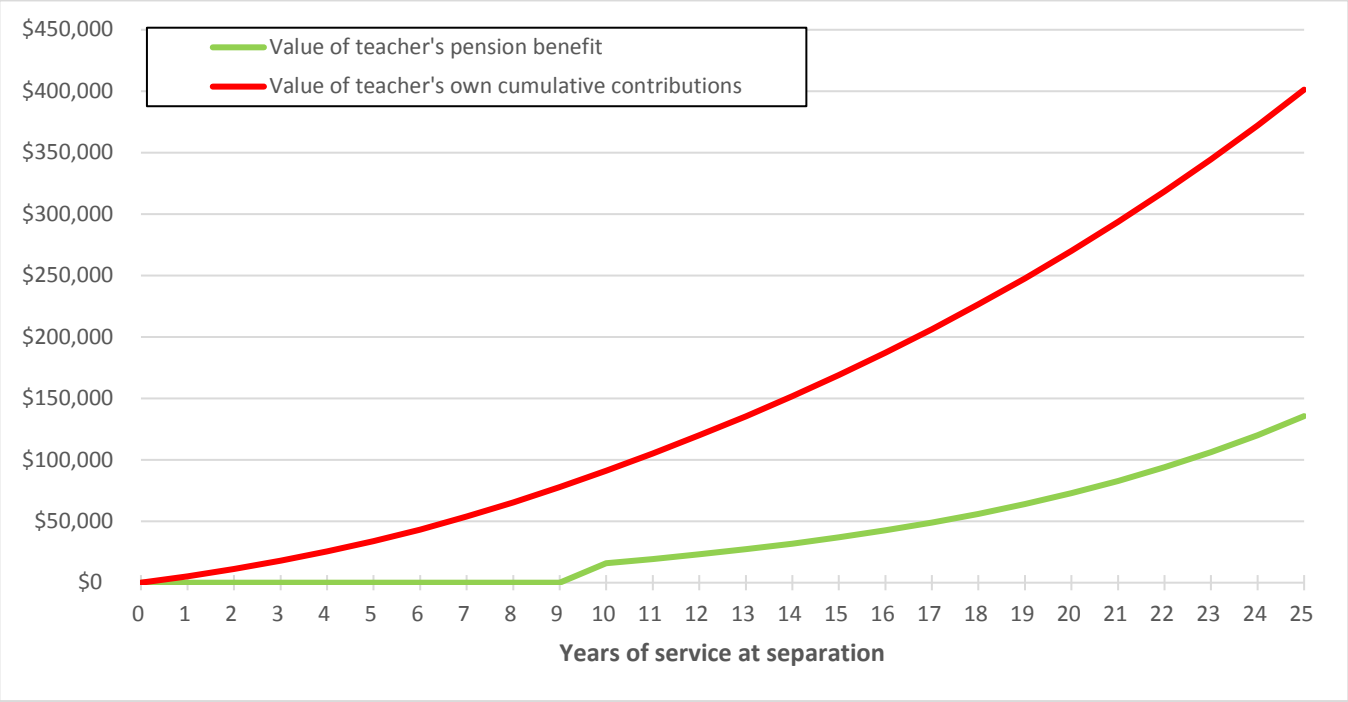
A new Boston Public Schools teacher enrolls in a traditional defined benefit plan under the Massachusetts Teachers' Retirement System.[1] In Boston, the crossover point never occurs, meaning that no matter how long a teacher stays, her retirement benefits will *always be worth less* than her contributions.

About the District	
Students	54,300
Teachers (FTE)	4,001

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	88,634
Total members	170,909

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of December, 2012)

Figure 1: No matter how long a new teacher in Boston Public Schools remains in the pension system, she will never realize a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. (Should the green line be higher than the red, her benefits would be worth more than her contributions and her net benefit would be positive.) In Boston, a new teacher never reaches the crossover point—the green line never crosses the red—and she will never receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "crossover point")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional defined benefit (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her pension wealth—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a defined contribution (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A hybrid plan combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Boston teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed $33,702 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension (A)	Value of teacher's contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 33,702	-$ 33,702
40	15	$ 36,881	$ 168,994	-$ 132,113
50	25	$ 135,553	$ 401,264	-$ 265,710

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 60. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $36,881, but at this point she has contributed a total of $168,994. Not only has she not yet reached the crossover point, but her pension wealth is worth barely 20 percent of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Boston teacher still has not reached the crossover point. In fact, the difference between her contributions and pension wealth is even larger than it was mid-career. At this point, she's contributed $401,264 but would only expect to receive $135,553 in benefits. And because the crossover point in Boston is infinite, no matter how many more years she stays, her contributions will *always* be worth less than her benefits (and her net benefit will *always* be negative).

Bottom line: Massachusetts teachers who start at age 25 under the Boston Public Schools salary schedule will never reach a crossover point. Teachers who exit the Massachusetts retirement system early, or even after a lengthy career, are financially disadvantaged, as they will never see any net benefits from their contributions.

Retirement System

Teachers working in Boston Public Schools belong to a traditional defined benefit pension plan in the Massachusetts Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 60/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): n/a

Employer and employee contributions

- Employee contribution rate: 11 percent of salary
- Employer contribution rate: 15.7 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)[9]

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Boston teacher qualifies for full pension benefits at age 60 with 10 years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 2.5 percent (although the accrual factor may be reduced depending on age and years of service upon retirement). A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does not offer reduced pension benefits for early retirement.

The employer contribution rate is set at 15.7 percent of earnings. The employee contribution rate is set at 11 percent of earnings.

Boston teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Boston Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 5,169	-$ 5,169
27	2	$ 0	$ 11,251	-$ 11,251
28	3	$ 0	$ 18,009	-$ 18,009
29	4	$ 0	$ 25,480	-$ 25,480
30	5	$ 0	$ 33,702	-$ 33,702
31	6	$ 0	$ 43,246	-$ 43,246
32	7	$ 0	$ 53,770	-$ 53,770
33	8	$ 0	$ 65,330	-$ 65,330
34	9	$ 0	$ 77,921	-$ 77,921
35	10	$ 15,710	$ 91,188	-$ 75,478
36	11	$ 19,253	$ 105,166	-$ 85,914
37	12	$ 23,141	$ 119,895	-$ 96,754
38	13	$ 27,338	$ 135,414	-$ 108,075
39	14	$ 31,833	$ 151,765	-$ 119,932
40	15	$ 36,881	$ 168,994	-$ 132,113
41	16	$ 42,545	$ 187,148	-$ 144,602
42	17	$ 48,894	$ 206,275	-$ 157,381
43	18	$ 56,004	$ 226,429	-$ 170,426
44	19	$ 63,960	$ 247,664	-$ 183,705
45	20	$ 72,858	$ 270,039	-$ 197,182
46	21	$ 82,801	$ 293,615	-$ 210,813
47	22	$ 93,906	$ 318,455	-$ 224,549
48	23	$ 106,302	$ 344,628	-$ 238,326
49	24	$ 120,131	$ 372,206	-$ 252,075
50	25	$ 135,553	$ 401,264	-$ 265,710

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $33,702 (B). Her net pension wealth accrued at this point is -$33,702, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] Calculations do not include RetirementPlus contributions and benefits.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 The multiplier of 2.5 percent applies only if retirement occurs at or after 67 years of age and 30 years of service; it is reduced incrementally for teachers who are younger and/or have fewer years of service. See the Urban Institute's plan database, http://apps.urban.org/features/SLEPP/plan_detail.html?planid=MA19.

10 A teacher who opts for a refund receives total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

ANOKA-HENNEPIN SCHOOL DISTRICT (MINNESOTA)

SUMMARY

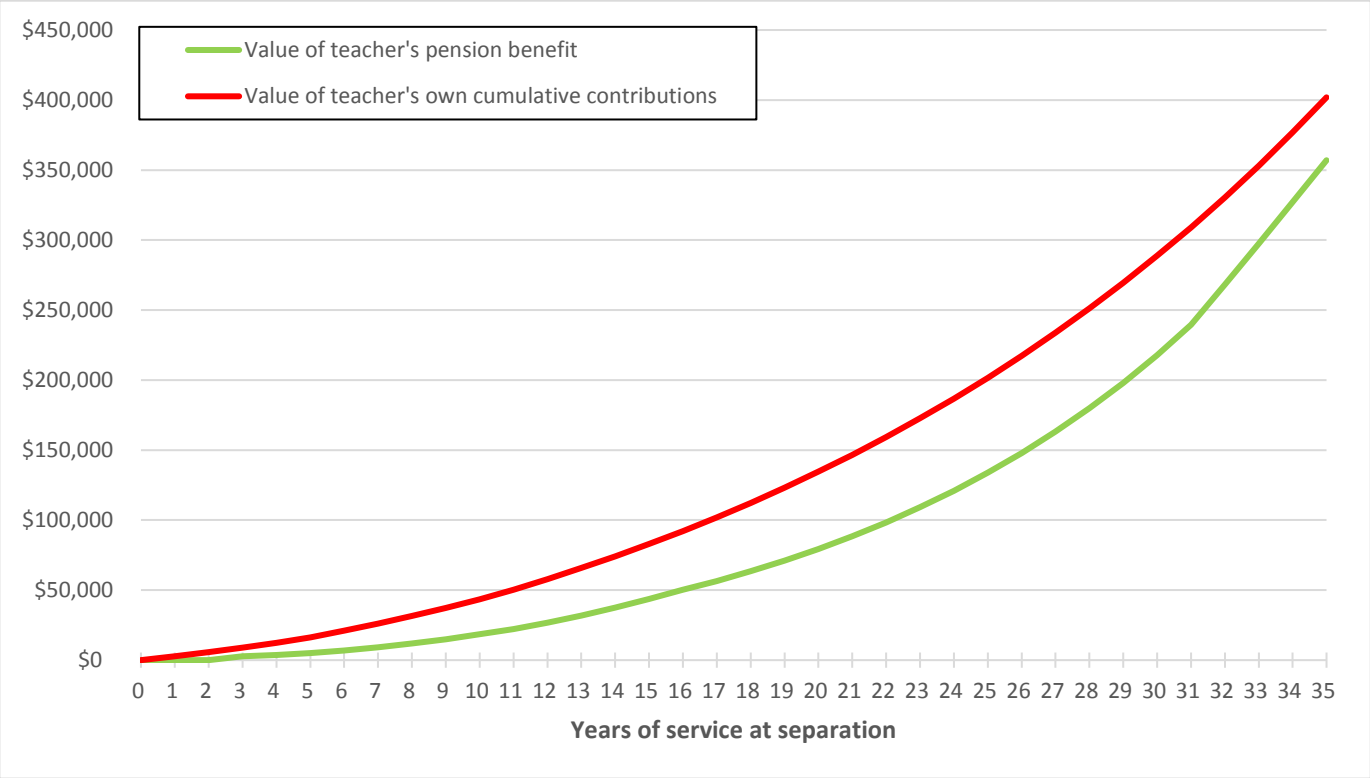
A new Anoka-Hennepin School District teacher enrolls in a traditional defined benefit plan under the Teachers Retirement Association of Minnesota. In Anoka-Hennepin, the crossover point never occurs, meaning that no matter how long a teacher stays, her retirement benefits will always be worth less than her contributions.

About the District	
Students	38,250
Teachers (FTE)	2,198

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	76,649
Total members	144,275

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: No matter how long a new teacher in Anoka-Hennepin School District remains in the pension system, she will never realize a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. (Should the green line be higher than the red, her benefits would be worth more than her contributions and her net benefit would be positive.) In Anoka-Hennepin, a new teacher never reaches the crossover point—the green line never crosses the red—and she will never receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[1] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[2] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[3] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[4] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Anoka-Hennepin teacher who leaves after **two years** of service (or at any point before the vesting point of three years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at two years she has contributed $5,671 into the retirement system.[5] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension (A)	Value of teacher's contributions to date (B)	Net benefit (A-B)
27	2	$ 0	$ 5,671	-$ 5,671
30	5	$ 5,027	$ 16,237	-$ 11,210
40	15	$ 43,774	$ 82,905	-$ 39,131
50	25	$ 133,827	$ 201,643	-$ 67,816

MID-CAREER

If she leaves the system with at least **three years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 66. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[6] Her pension wealth is $43,774, but at this point she has contributed a total of $82,905. Not only has she not yet reached the crossover point, but her pension wealth is worth only just over half of her contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[7] But even after 25 years, an Anoka-Hennepin teacher still has not reached the crossover point. In fact, the difference between her contributions and pension wealth is even greater than it was mid-career. At this point, she's contributed $201,643 but would only expect to receive $133,827 in benefits. And because the crossover point in Anoka-Hennepin is infinite, no matter how many more years she stays, her benefits will *always* be worth less than her cumulative contributions (and her net benefit will *always* be negative).

Bottom line: Minnesota teachers who start at age 25 under the Anoka-Hennepin School District salary schedule will never reach a crossover point. Teachers who exit the Minnesota retirement system early, or even after a lengthy career, are financially disadvantaged as they will never see any net benefits from their contributions.

Retirement System

Teachers working in Anoka-Hennepin School District belong to a traditional defined benefit pension plan in the Teachers Retirement Association of Minnesota.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Three years
- Normal retirement eligibility requirements (age/years of service): 66/3
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/3

Employer and employee contributions

- Employee contribution rate: 7.5 percent of salary
- Employer contribution rate: 8.18 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.9%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, Anoka-Hennepin teachers qualify for full pension benefits at age 66 with three years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.9 percent. A teacher vests into the pension system after three years—meaning after three years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[8] The plan does offer reduced pension benefits for early retirement, available at age 55 with three years of service.

The employer contribution rate is set at 8.18 percent of earnings. The employee contribution rate is set at 7.5 percent of earnings.

Anoka-Hennepin teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[9]
- Survival probabilities from *2007 CDC Life Tables*[10]
- Teacher salary schedule for 2012–13 school year[11]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[12] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[13]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Anoka-Hennepin School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,724	-$ 2,724
27	2	$ 0	$ 5,671	-$ 5,671
28	3	$ 2,649	$ 8,912	-$ 6,263
29	4	$ 3,772	$ 12,434	-$ 8,662
30	5	$ 5,027	$ 16,237	-$ 11,210
31	6	$ 6,917	$ 21,006	-$ 14,089
32	7	$ 9,146	$ 26,030	-$ 16,884
33	8	$ 11,809	$ 31,488	-$ 19,679
34	9	$ 14,854	$ 37,239	-$ 22,385
35	10	$ 18,459	$ 43,462	-$ 25,003
36	11	$ 22,155	$ 50,275	-$ 28,120
37	12	$ 26,788	$ 57,805	-$ 31,016
38	13	$ 31,857	$ 65,738	-$ 33,881
39	14	$ 37,589	$ 74,097	-$ 36,508
40	15	$ 43,774	$ 82,905	-$ 39,131
41	16	$ 50,198	$ 92,185	-$ 41,987
42	17	$ 56,557	$ 101,963	-$ 45,406
43	18	$ 63,511	$ 112,266	-$ 48,755
44	19	$ 71,112	$ 123,122	-$ 52,010
45	20	$ 79,416	$ 134,560	-$ 55,144
46	21	$ 88,485	$ 146,612	-$ 58,127
47	22	$ 98,385	$ 159,311	-$ 60,926
48	23	$ 109,188	$ 172,691	-$ 63,503
49	24	$ 120,973	$ 186,789	-$ 65,816
50	25	$ 133,827	$ 201,643	-$ 67,816
51	26	$ 147,846	$ 217,295	-$ 69,450
52	27	$ 163,133	$ 233,786	-$ 70,653
53	28	$ 179,803	$ 251,163	-$ 71,360
54	29	$ 197,979	$ 269,471	-$ 71,492
55	30	$ 217,796	$ 288,763	-$ 70,966
56	31	$ 239,406	$ 309,089	-$ 69,683
57	32	$ 268,215	$ 330,506	-$ 62,291
58	33	$ 297,492	$ 353,072	-$ 55,580
59	34	$ 327,121	$ 376,849	-$ 49,728
60	35	$ 356,981	$ 401,902	-$ 44,921
61	36	$ 386,951	$ 428,299	-$ 41,348
62	37	$ 416,900	$ 456,113	-$ 39,213
63	38	$ 446,683	$ 485,419	-$ 38,736

64	39	$ 476,143	$ 516,297	-$ 40,154
65	40	$ 505,121	$ 548,833	-$ 43,711
66	41	$ 533,486	$ 583,114	-$ 49,627

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $5,027 (A) and her cumulative contributions are worth $16,237 (B). Her net pension wealth accrued at this point is -$11,210, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[2] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[3] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[4] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[5] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

6 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

7 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

8 A teacher who opts for a refund receives total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

9 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

10 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

11 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

12 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

13 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

DESOTO COUNTY SCHOOL DISTRICT (MISSISSIPPI)

SUMMARY

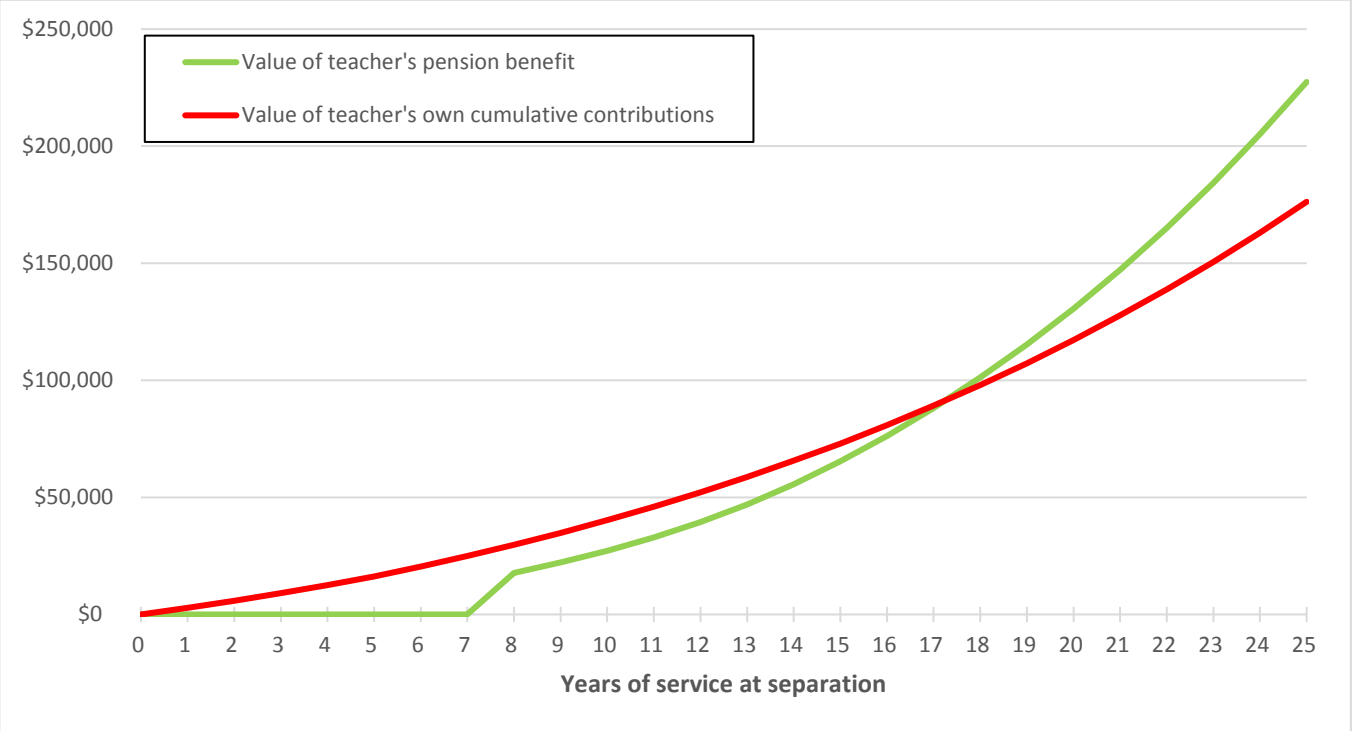
DeSoto County School District teachers enroll in a traditional defined benefit plan under the Public Employees' Retirement System of Mississippi. In DeSoto County, the crossover point occurs after 18 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and one of the shortest in the group.[1]

About the District	
Students	33,054
Teachers (FTE)	1,926

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	162,311
Total members	380,281

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in DeSoto County must remain in the pension system for 18 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In DeSoto County, a new teacher must stay 18 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A DeSoto County teacher who leaves after **five years** of service (or at any point before the vesting point of eight years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed $16,284 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 16,284	-$ 16,284
40	15	$ 65,368	$ 73,006	-$ 7,638
43	18	$ 101,175	$ 97,959	$ 3,216
50	25	$ 227,432	$ 176,257	$ 51,175

MID-CAREER

If she leaves the system with at least **eight** years of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $65,368, but at this point she has contributed a total of $73,006. Not only has she not yet reached the crossover point, but her pension wealth is worth approximately $7,600 less than her cumulative contributions.

AT THE CROSSOVER

After 18 years, a DeSoto County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $97,959 into the system and can expect lifetime pension wealth accrual worth $101,175. Her net benefit becomes positive, though small ($3,216).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a DeSoto County teacher still does not have a large net benefit ($51,175). (Said another way, the red and green lines in Figure 1 remain close together after the crossover.)

Bottom line: Mississippi teachers who start at age 25 under the DeSoto County School District salary schedule must wait 18 years to reach the crossover point. Teachers who exit the Mississippi retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 18 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the DeSoto County School District belong to a traditional defined benefit pension plan in the Public Employees' Retirement System of Mississippi.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Eight years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/8 and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): Any/8

Employer and employee contributions

- Employee contribution rate: 9 percent of salary
- Employer contribution rate: 15.75 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS up to 30) x (FAS) + (2.5%) x (YOS beyond 30) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the four highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a DeSoto County teacher qualifies for full pension benefits at age 60 with eight years of service or any age with 30 years, whichever comes first. The annual benefit has two parts: (1) a teacher's years of service up to 30 years, multiplied by her average salary of her final four years, times an accrual factor of 2.0 percent, and (2) a teacher's years of service greater than 30, multiplied by her average salary of her final four years, times an accrual factor of 2.5 percent. A teacher vests into the pension system after eight years—meaning after eight years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at any age with eight years of service.

The employer contribution rate is set at 15.75 percent of earnings. The employee contribution rate is set at 9 percent of earnings. DeSoto County teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the DeSoto County School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,843	-$ 2,843
27	2	$ 0	$ 5,882	-$ 5,882
28	3	$ 0	$ 9,128	-$ 9,128
29	4	$ 0	$ 12,592	-$ 12,592
30	5	$ 0	$ 16,284	-$ 16,284
31	6	$ 0	$ 20,479	-$ 20,479
32	7	$ 0	$ 24,956	-$ 24,956
33	8	$ 17,672	$ 29,732	-$ 12,060
34	9	$ 22,253	$ 34,822	-$ 12,569
35	10	$ 27,179	$ 40,242	-$ 13,063
36	11	$ 32,874	$ 46,019	-$ 13,145
37	12	$ 39,424	$ 52,163	-$ 12,739
38	13	$ 46,942	$ 58,695	-$ 11,753
39	14	$ 55,552	$ 65,635	-$ 10,084
40	15	$ 65,368	$ 73,006	-$ 7,638
41	16	$ 76,254	$ 80,837	-$ 4,583
42	17	$ 88,174	$ 89,146	-$ 973
43	18	$ 101,175	$ 97,959	$ 3,216
44	19	$ 115,311	$ 107,303	$ 8,008
45	20	$ 130,588	$ 117,206	$ 13,382
46	21	$ 147,172	$ 127,705	$ 19,467
47	22	$ 165,077	$ 138,826	$ 26,251
48	23	$ 184,379	$ 150,601	$ 33,778
49	24	$ 205,160	$ 163,065	$ 42,094
50	25	$ 227,432	$ 176,257	$ 51,175

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $16,284 (B). Her net pension wealth accrued at this point is -$16,284, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

SPRINGFIELD PUBLIC SCHOOLS (MISSOURI)

SUMMARY

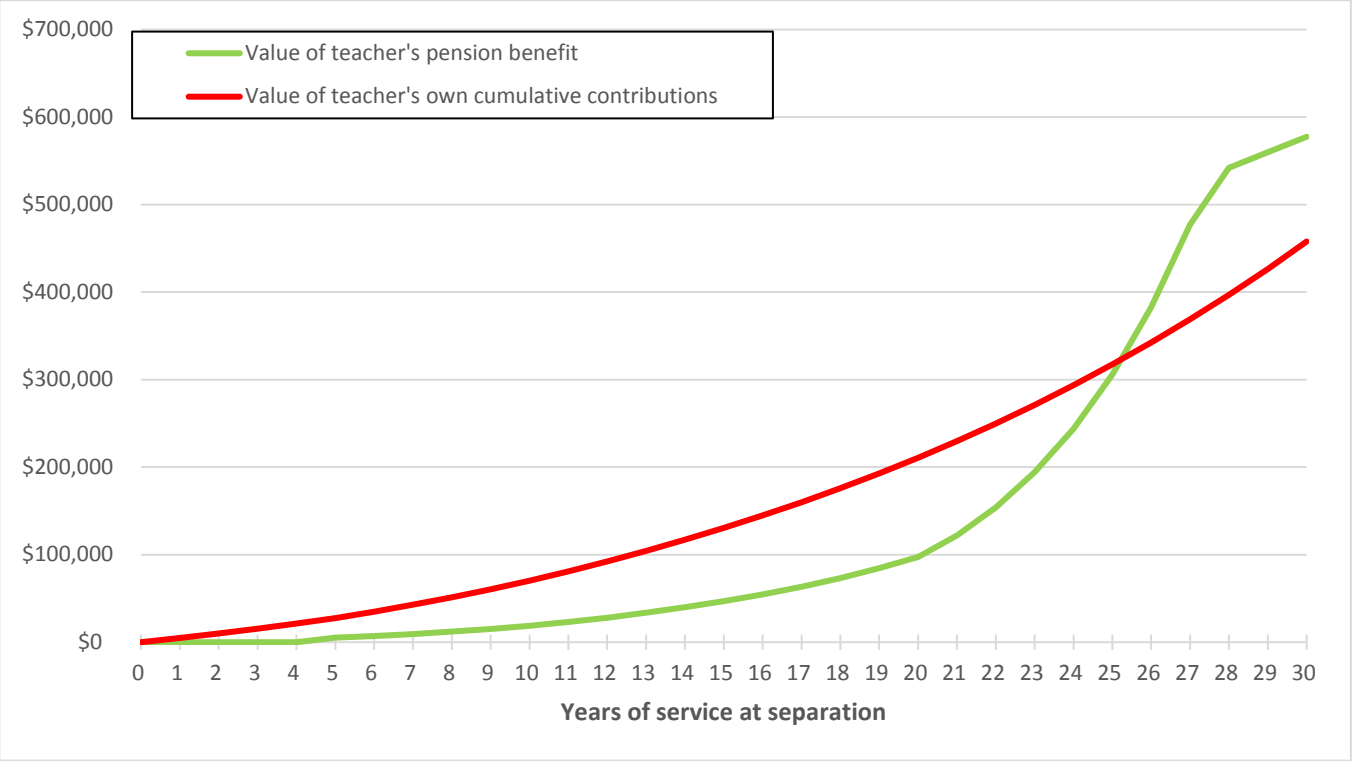
Springfield Public Schools teachers enroll in a traditional defined benefit plan under the Public School Retirement System of Missouri. In Springfield, the crossover point occurs after 26 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is just one year shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	25,609
Teachers (FTE)	1,662

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	77,529
Total members	139,396

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Springfield Public Schools must remain in the pension system for 26 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Springfield, a new teacher must stay 26 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Springfield teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $15,398 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is her pension wealth? How much has she contributed? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 15,398	-$ 15,398
40	15	$ 46,818	$ 130,475	-$ 83,657
50	25	$ 305,784	$ 317,348	-$ 11,564
51	26	$ 382,393	$ 342,440	$ 39,953

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $46,818, but at this point she has contributed a total of $130,475. Not only has she not yet reached the crossover point, but her pension wealth is worth barely one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Springfield teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $317,348 but would only expect to receive $305,784 in benefits.

AT THE CROSSOVER

After 26 years, a Springfield teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $342,440 into the system and can expect lifetime pension wealth accrual worth $382,393. Her net benefit becomes positive, and, though it is still fairly modest ($39,953), it is a large change in net benefit compared to the year before.

Bottom line: Missouri teachers who start at age 25 under the Springfield Public Schools salary schedule must wait 26 years to reach the crossover point. Teachers who exit the Missouri retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 26 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Springfield Public Schools belong to a traditional defined benefit pension plan in the Public School Retirement System of Missouri.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/5, any/30, and Rule of 80
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 55/5 and any/25

Employer and employee contributions

- Employee contribution rate: 14.5 percent of salary
- Employer contribution rate: 14.5 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the 3 highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Springfield teacher qualifies for full pension benefits at age 60 with five years of service, at any age with 30 years of service, or if the sum of a teacher's age and years of service is at least 80 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.5 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service or at any age with 25 years of service, whichever comes first.

The employer contribution rate is set at 14.5 percent of earnings. The employee contribution rate is set at 14.5 percent of earnings. Springfield teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Springfield Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 4,774	-$ 4,774
27	2	$ 0	$ 9,900	-$ 9,900
28	3	$ 0	$ 15,398	-$ 15,398
29	4	$ 0	$ 21,291	-$ 21,291
30	5	$ 5,074	$ 27,601	-$ 22,527
31	6	$ 7,005	$ 35,015	-$ 28,010
32	7	$ 9,370	$ 42,946	-$ 33,576
33	8	$ 12,240	$ 51,422	-$ 39,182
34	9	$ 15,198	$ 60,498	-$ 45,300
35	10	$ 18,740	$ 70,289	-$ 51,549
36	11	$ 22,995	$ 80,839	-$ 57,844
37	12	$ 28,082	$ 92,191	-$ 64,109
38	13	$ 33,757	$ 104,223	-$ 70,466
39	14	$ 40,010	$ 116,971	-$ 76,961
40	15	$ 46,818	$ 130,475	-$ 83,657
41	16	$ 54,549	$ 144,776	-$ 90,226
42	17	$ 63,315	$ 159,917	-$ 96,602
43	18	$ 73,247	$ 175,944	-$ 102,697
44	19	$ 84,488	$ 192,905	-$ 108,418
45	20	$ 97,204	$ 210,852	-$ 113,648
46	21	$ 121,830	$ 229,838	-$ 108,008
47	22	$ 154,021	$ 249,920	-$ 95,899
48	23	$ 194,113	$ 271,156	-$ 77,043
49	24	$ 243,946	$ 293,610	-$ 49,664
50	25	$ 305,784	$ 317,348	-$ 11,564
51	26	$ 382,393	$ 342,440	$ 39,953
52	27	$ 477,162	$ 368,958	$ 108,204
53	28	$ 541,811	$ 396,981	$ 144,829
54	29	$ 559,873	$ 426,590	$ 133,283
55	30	$ 577,512	$ 457,873	$ 119,639

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $5,074 (A) and her cumulative contributions are worth $27,601 (B). Her net pension wealth accrued at this point is -$22,527, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

BILLINGS PUBLIC SCHOOLS (MONTANA)

SUMMARY

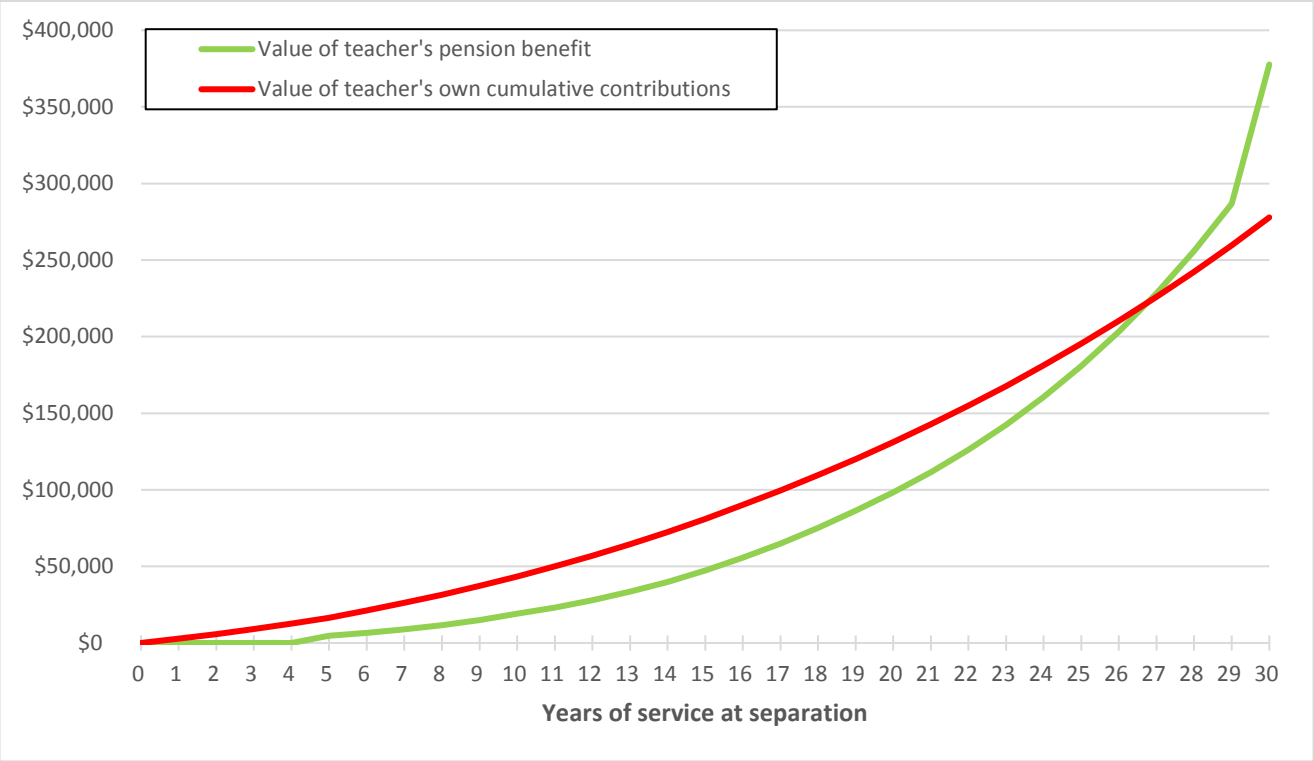
Billings Public Schools teachers enroll in a traditional defined benefit plan under the Montana Teachers' Retirement System. In Billings, the crossover point occurs after 27 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is equal to the national median crossover point of the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	16,388
Teachers (FTE)	961

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	18,372
Total members	44,473

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of July, 2012)

Figure 1: A new teacher in Billings Public Schools must remain in the pension system for 27 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Billings, a new teacher must stay 27 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Billings teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $9,127 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 9,127	-$ 9,127
40	15	$ 47,262	$ 81,057	-$ 33,795
50	25	$ 180,760	$ 195,360	-$ 14,600
52	27	$ 228,185	$ 225,903	$ 2,281

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $47,262, but at this point she has contributed a total of $81,057. Not only has she not yet reached the crossover point, but her pension wealth worth is almost $34,000 less than her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Billings teacher still has not reached the crossover point, although the difference between the value of her contributions and her pension wealth is smaller than it was mid-career. At this point, she's contributed $195,360 but would only expect to receive $180,760 in benefits.

AT THE CROSSOVER

After 27 years, a Billings teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $225,903 into the system and can expect lifetime pension wealth accrual worth $228,185. Her net benefit becomes positive, though quite modest ($2,281). The net benefit increases thereafter—after three more years it will be nearly $100,000.

Bottom line: Montana teachers who start at age 25 under the Billings Public Schools salary schedule must wait 27 years to reach the crossover point. Teachers who exit the Montana retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 27 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Billings Public Schools belong to a traditional defined benefit pension plan in the Montana Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/5 and 55/30, or 60/30 with an increased multiplier (see below)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions

- Employee contribution rate: 8.15 percent of salary
- Employer contribution rate: 11.16 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (MULTIPLIER) x (YOS) x (FAS)

Where the MULTIPLIER varies according to when the teacher retires: YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Retirement condition	Multiplier
60/5	1.67%
55/30	1.67%
60/30	1.85%

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Billings teacher qualifies for full pension benefits at age 60 with five years of service or age 55 with 30 years of service (whichever comes first); if she is age 60 with 30 years of service, she qualifies for a higher multiplier. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of either 1.67 or 1.85 percent (depending on her age and years of service at retirement). A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service.

The employer contribution rate is set at 11.16 percent of earnings. The employee contribution rate is set at 8.15 percent of earnings. Billings teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Billings Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,814	-$ 2,814
27	2	$ 0	$ 5,852	-$ 5,852
28	3	$ 0	$ 9,127	-$ 9,127
29	4	$ 0	$ 12,649	-$ 12,649
30	5	$ 4,808	$ 16,432	-$ 11,625
31	6	$ 6,662	$ 21,115	-$ 14,453
32	7	$ 8,939	$ 26,138	-$ 17,199
33	8	$ 11,709	$ 31,520	-$ 19,812
34	9	$ 15,048	$ 37,279	-$ 22,231
35	10	$ 19,048	$ 43,434	-$ 24,386
36	11	$ 23,162	$ 50,005	-$ 26,844
37	12	$ 27,945	$ 57,036	-$ 29,091
38	13	$ 33,440	$ 64,513	-$ 31,072
39	14	$ 39,737	$ 72,461	-$ 32,724
40	15	$ 47,262	$ 81,057	-$ 33,795
41	16	$ 55,664	$ 90,093	-$ 34,429
42	17	$ 64,933	$ 99,592	-$ 34,659
43	18	$ 75,192	$ 109,577	-$ 34,385
44	19	$ 86,484	$ 120,074	-$ 33,590
45	20	$ 98,287	$ 131,108	-$ 32,821
46	21	$ 111,443	$ 142,708	-$ 31,265
47	22	$ 126,097	$ 154,902	-$ 28,804
48	23	$ 142,412	$ 167,720	-$ 25,308
49	24	$ 160,566	$ 181,195	-$ 20,629
50	25	$ 180,760	$ 195,360	-$ 14,600
51	26	$ 203,217	$ 210,250	-$ 7,034
52	27	$ 228,185	$ 225,903	$ 2,281
53	28	$ 255,939	$ 242,358	$ 13,580
54	29	$ 286,782	$ 259,656	$ 27,126
55	30	$ 377,709	$ 277,840	$ 99,870

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,808 (A) and her cumulative contributions are worth $16,432 (B). Her net pension wealth accrued at this point is -$11,625, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

OMAHA PUBLIC SCHOOL DISTRICT (NEBRASKA)

SUMMARY

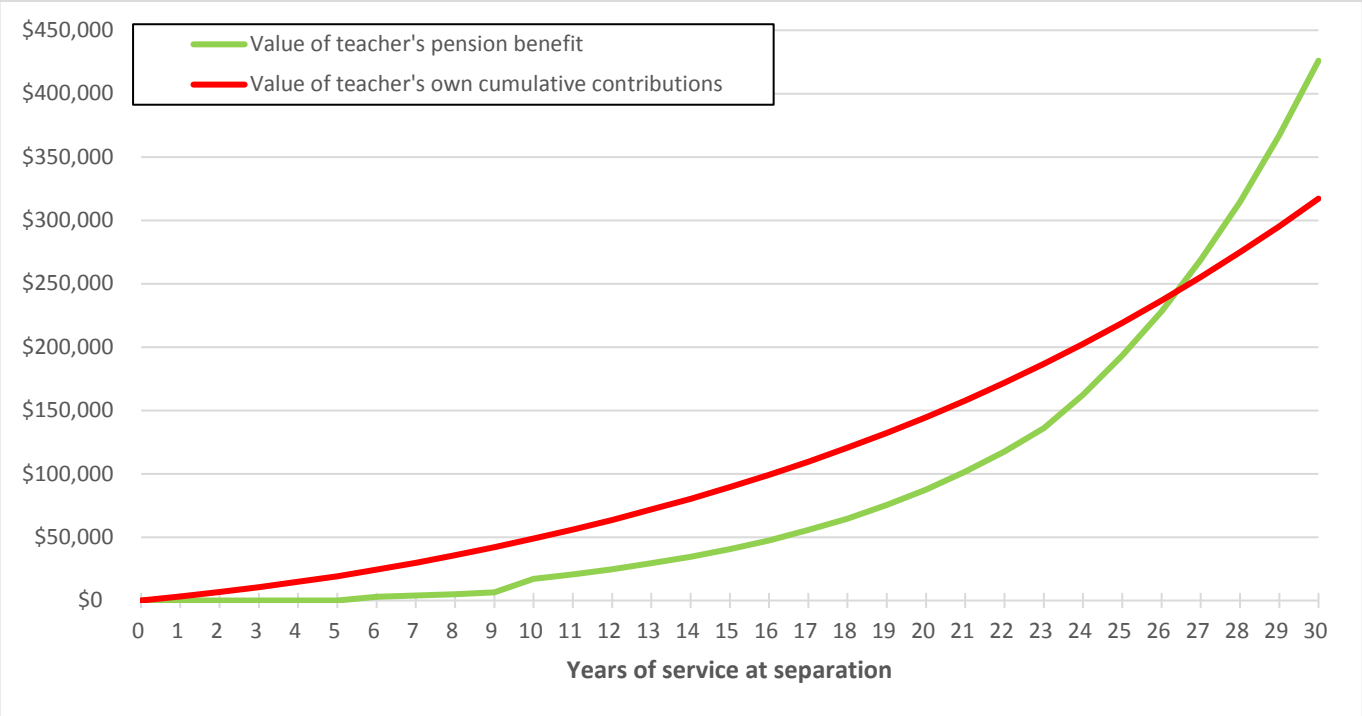
A new Omaha Public School District teacher enrolls in a traditional defined benefit plan under the Omaha School Employees' Retirement System. In Omaha, the crossover point occurs after 27 years of service, meaning that until that point the value of what she would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is equal to the national median crossover point of the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	51,069
Teachers (FTE)	3,147

About the Retirement Plan	
Type	Defined benefit
Coverage	Local
Active members	7,393
Total members	12,728

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Annual Actuarial Report, Omaha School Employees' Retirement System (membership as of September, 2015)

Figure 1: A new teacher in the Omaha Public School District must remain in the pension system for 27 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Omaha, a new teacher must stay 27 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Omaha teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $10,591 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 10,591	-$ 10,591
40	15	$ 40,530	$ 89,468	-$ 48,939
50	25	$ 193,214	$ 219,011	-$ 25,798
52	27	$ 268,852	$ 255,218	$ 13,634

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $40,530, but at this point she has contributed a total of $89,468. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, an Omaha teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $219,011 but would only expect to receive $193,214 in benefits.

AT THE CROSSOVER

After 27 years, an Omaha teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $255,218 into the system and can expect lifetime pension wealth accrual worth $268,852. Her net benefit becomes positive, though modest ($13,634).

Bottom line: Teachers who start at age 25 under the Omaha Public School District salary schedule must wait 27 years to reach the crossover point. Teachers who exit the retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 27 years.

TECHNICAL MATTERS

Retirement System

Teachers working the Omaha Public School District belong to a traditional defined benefit pension plan in the Omaha School Employees' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5, 62/10, and 55/(Rule of 85)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/10

Employer and employee contributions

- Employee contribution rate: 9.78 percent of salary
- Employer contribution rate: 11.88 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, Omaha teachers qualify for full pension benefits at age 65 with five years of service, age 62 with 10 years of service, or age 55 as long as the sum of age and years of service is at least 85 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with 10 years of service.

The employer contribution rate is set at 11.88 percent of earnings. The employee contribution rate is set at 9.78 percent of earnings. Omaha teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Omaha Public School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,263	-$ 3,263
27	2	$ 0	$ 6,831	-$ 6,831
28	3	$ 0	$ 10,591	-$ 10,591
29	4	$ 0	$ 14,683	-$ 14,683
30	5	$ 0	$ 19,125	-$ 19,125
31	6	$ 2,946	$ 24,328	-$ 21,382
32	7	$ 3,876	$ 29,810	-$ 25,933
33	8	$ 5,017	$ 35,716	-$ 30,699
34	9	$ 6,378	$ 42,070	-$ 35,692
35	10	$ 16,972	$ 48,895	-$ 31,923
36	11	$ 20,545	$ 56,087	-$ 35,542
37	12	$ 24,648	$ 63,665	-$ 39,016
38	13	$ 29,368	$ 71,779	-$ 42,411
39	14	$ 34,582	$ 80,329	-$ 45,747
40	15	$ 40,530	$ 89,468	-$ 48,939
41	16	$ 47,463	$ 99,187	-$ 51,724
42	17	$ 55,654	$ 109,557	-$ 53,903
43	18	$ 64,668	$ 120,485	-$ 55,817
44	19	$ 75,293	$ 132,128	-$ 56,835
45	20	$ 87,420	$ 144,528	-$ 57,108
46	21	$ 101,759	$ 157,811	-$ 56,053
47	22	$ 117,536	$ 171,808	-$ 54,272
48	23	$ 136,087	$ 186,686	-$ 50,599
49	24	$ 162,397	$ 202,363	-$ 39,966
50	25	$ 193,214	$ 219,011	-$ 25,798
51	26	$ 228,240	$ 236,642	-$ 8,402
52	27	$ 268,852	$ 255,218	$ 13,634
53	28	$ 314,551	$ 274,791	$ 39,760
54	29	$ 367,192	$ 295,415	$ 71,777
55	30	$ 425,994	$ 317,145	$ 108,849

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $19,125 (B). Her net pension wealth accrued at this point is -$19,125, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

CLARK COUNTY SCHOOL DISTRICT (NEVADA)

SUMMARY

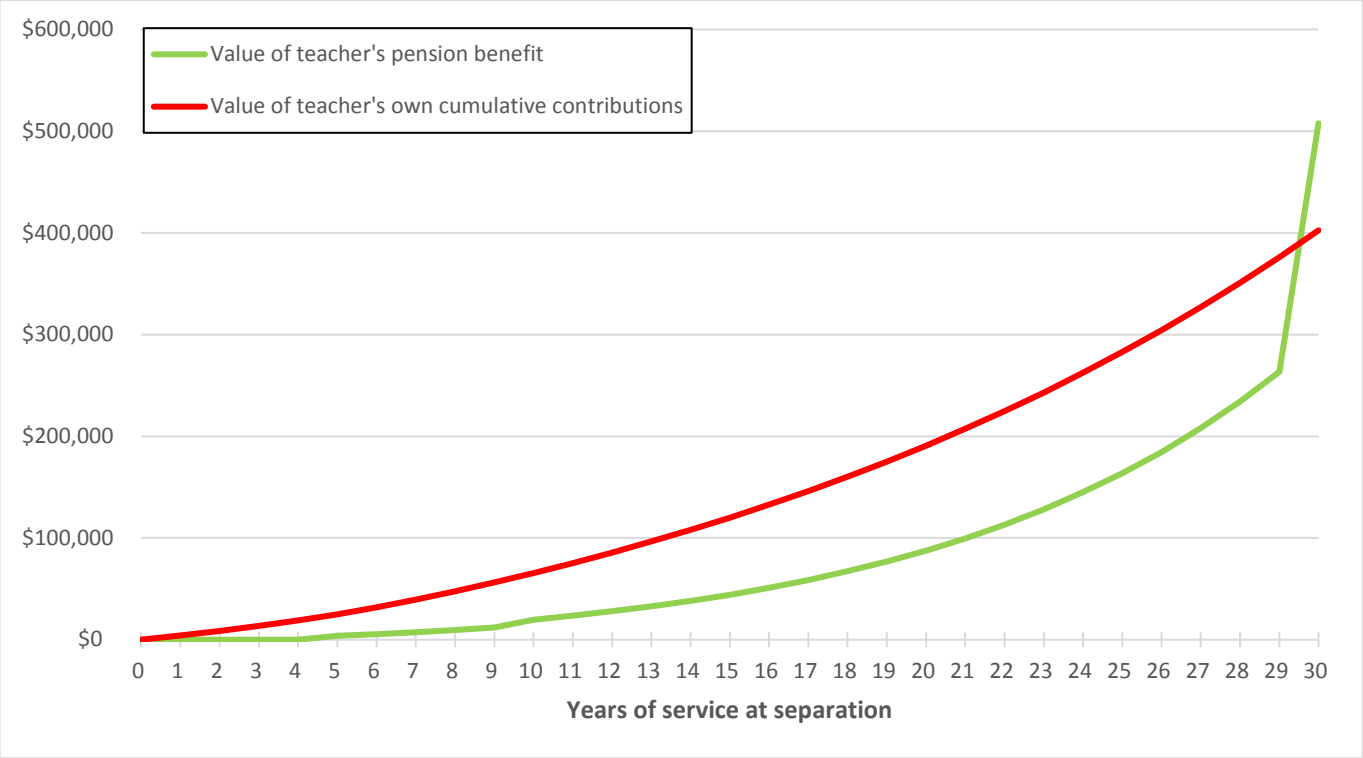
Clark County School District teachers enroll in a traditional defined benefit plan under the Public Employees' Retirement System of Nevada. In Clark County, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	320,532
Teachers (FTE)	15,321

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	98,512
Total members	161,020

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in the Clark County School District must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Clark County, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Clark County teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $13,645 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 13,645	-$ 13,645
40	15	$ 44,270	$ 120,075	-$ 75,805
50	25	$ 163,642	$ 282,828	-$ 119,186
55	30	$ 507,748	$ 402,510	$ 105,238

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $44,270, but at this point she has contributed a total of $120,075. Not only has she not yet reached the crossover point, but her pension wealth is worth barely one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Clark County teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is larger than it was mid-career. At this point, she's contributed $282,828 but would only expect to receive $163,642 in benefits.

AT THE CROSSOVER

After 30 years, a Clark County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $402,510 into the system and can expect lifetime pension wealth accrual worth $507,748. Her net benefit becomes positive, and it's also quite large ($105,238) as her pension wealth grows late in her career.

Bottom line: Nevada teachers who start at age 25 under the Clark County School District salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Nevada retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Clark County School District belong to a traditional defined benefit pension plan in the Public Employees' Retirement System of Nevada.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5, 62/10, and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/5

Employer and employee contributions

- Employee contribution rate: 12.25 percent of salary
- Employer contribution rate: 12.25 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Clark County teacher qualifies for full pension benefits at age 65 with five years of service, age 62 with 10 years of service, or any age with 30 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.5 percent.[10] A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[11] The plan does offer reduced pension benefits for early retirement, available at any age with five years of service.

The employer contribution rate is set at 12.25 percent of earnings. The employee contribution rate is set at 12.25 percent of earnings. Clark County teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[12]
- Survival probabilities from *2007 CDC Life Tables*[13]
- Teacher salary schedule for 2012–13 school year[14]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[15] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[16]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Clark County School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 4,146	-$ 4,146
27	2	$ 0	$ 8,687	-$ 8,687
28	3	$ 0	$ 13,645	-$ 13,645
29	4	$ 0	$ 19,043	-$ 19,043
30	5	$ 3,780	$ 24,903	-$ 21,123
31	6	$ 5,325	$ 31,921	-$ 26,596
32	7	$ 7,238	$ 39,488	-$ 32,250
33	8	$ 9,580	$ 47,635	-$ 38,055
34	9	$ 11,994	$ 56,393	-$ 44,399
35	10	$ 19,609	$ 65,621	-$ 46,012
36	11	$ 23,609	$ 75,404	-$ 51,796
37	12	$ 27,931	$ 85,712	-$ 57,781
38	13	$ 32,815	$ 96,573	-$ 63,758
39	14	$ 38,210	$ 108,017	-$ 69,807
40	15	$ 44,270	$ 120,075	-$ 75,805
41	16	$ 51,069	$ 132,780	-$ 81,711
42	17	$ 58,708	$ 146,173	-$ 87,464
43	18	$ 67,267	$ 160,284	-$ 93,017
44	19	$ 76,847	$ 175,152	-$ 98,305
45	20	$ 87,537	$ 190,818	-$ 103,281
46	21	$ 99,485	$ 207,325	-$ 107,841
47	22	$ 113,011	$ 224,748	-$ 111,737
48	23	$ 128,131	$ 243,105	-$ 114,974
49	24	$ 145,024	$ 262,447	-$ 117,423
50	25	$ 163,642	$ 282,828	-$ 119,186
51	26	$ 184,399	$ 304,301	-$ 119,902
52	27	$ 207,940	$ 326,963	-$ 119,024
53	28	$ 234,215	$ 350,841	-$ 116,626
54	29	$ 263,534	$ 376,000	-$ 112,466
55	30	$ 507,748	$ 402,510	$ 105,238

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,780 (A) and her cumulative contributions are worth $24,903 (B). Her net pension wealth accrued at this point is -$21,123, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTE

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 She cannot receive an annual benefit of greater than 75 percent of her final average salary, which is equivalent to a maximum of 30 years of applicable years of service. If she has more YOS, her benefit does not increase.

11 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

12 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

13 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

14 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

15 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

16 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

MANCHESTER SCHOOL DISTRICT (NEW HAMPSHIRE)

SUMMARY

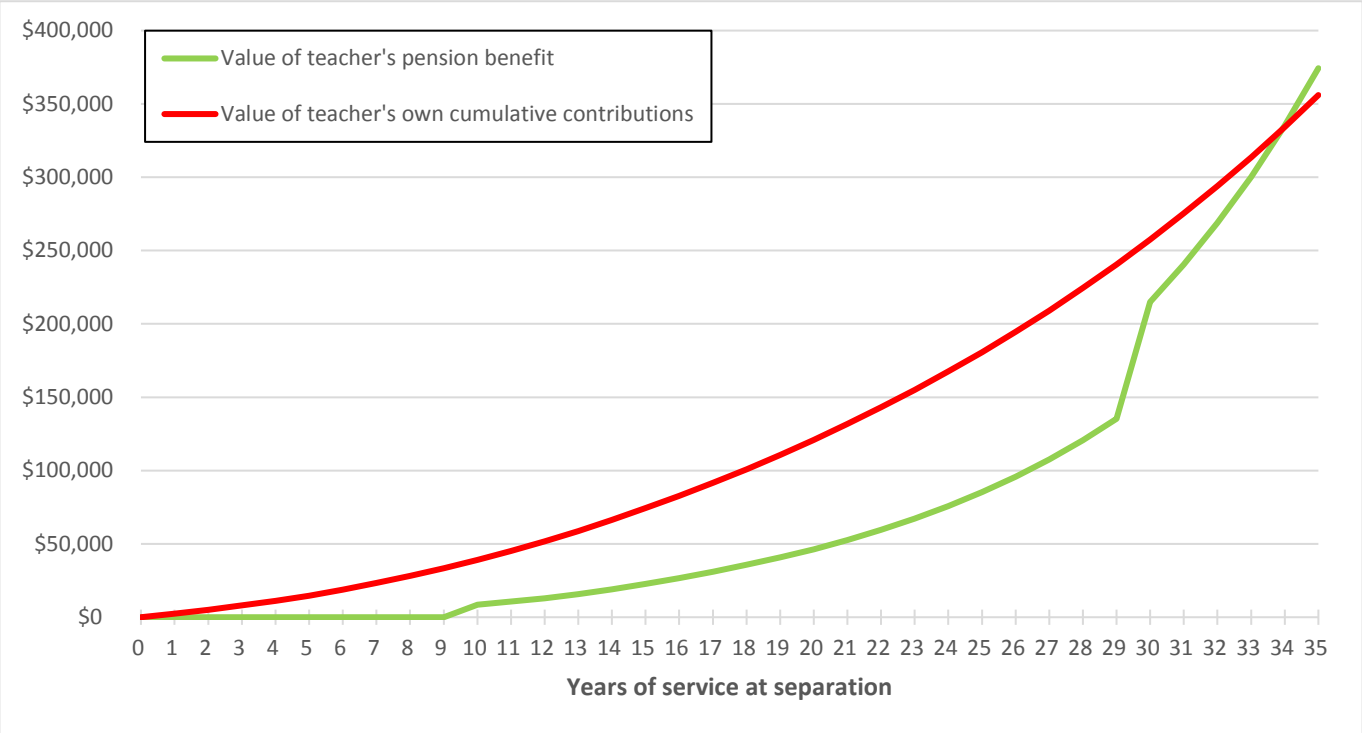
A new Manchester School District teacher enrolls in a traditional defined benefit plan under the New Hampshire Retirement System. In Manchester, the crossover point occurs after 34 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	14,336
Teachers (FTE)	986

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	18,161
Total members	28,705

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in the Manchester School District must remain in the pension system for 34 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Manchester, a new teacher must stay 34 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Manchester teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $14,746 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 14,746	-$ 14,746
40	15	$ 22,622	$ 74,344	-$ 51,722
50	25	$ 85,307	$ 180,720	-$ 95,413
59	34	$ 335,334	$ 334,294	$ 1,039

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 65. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $22,622, but at this point she has contributed a total of $74,344. Not only has she not yet reached the crossover point, but her pension wealth is worth less than one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] But even after 25 years, a Manchester teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is larger than was mid-career. At this point, she's contributed $180,720 but would only expect to receive $85,307 in benefits.

AT THE CROSSOVER

After 34 years, a Manchester teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $334,294 into the system and can expect lifetime pension wealth accrual worth $335,334. Her net benefit becomes positive, though small ($1,039).

Bottom line: New Hampshire teachers who start at age 25 under the Manchester School District salary schedule must wait 34 years to reach the crossover point. Teachers who exit the New Hampshire retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 34 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Manchester School District belong to a traditional defined benefit pension plan in the New Hampshire Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 65/any
- Early retirement eligibility requirements for reduced benefits (age/years of service): 60/30

Employer and employee contributions

- Employee contribution rate: 7.0 percent of salary
- Employer contribution rate: 12.09 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.52%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Manchester teacher qualifies for full pension benefits at age 65. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.52 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at age 60 with 30 years of service.

The employer contribution rate is set at 12.09 percent of earnings. The employee contribution rate is set at 7.0 percent of earnings.

Manchester teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Manchester School District

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,456	-$ 2,456
27	2	$ 0	$ 5,098	-$ 5,098
28	3	$ 0	$ 8,017	-$ 8,017
29	4	$ 0	$ 11,228	-$ 11,228
30	5	$ 0	$ 14,746	-$ 14,746
31	6	$ 0	$ 18,872	-$ 18,872
32	7	$ 0	$ 23,351	-$ 23,351
33	8	$ 0	$ 28,202	-$ 28,202
34	9	$ 0	$ 33,443	-$ 33,443
35	10	$ 8,631	$ 39,096	-$ 30,464
36	11	$ 10,638	$ 45,180	-$ 34,543
37	12	$ 12,985	$ 51,719	-$ 38,734
38	13	$ 15,720	$ 58,735	-$ 43,015
39	14	$ 18,984	$ 66,344	-$ 47,360
40	15	$ 22,622	$ 74,344	-$ 51,722
41	16	$ 26,641	$ 82,753	-$ 56,112
42	17	$ 31,042	$ 91,593	-$ 60,552
43	18	$ 35,821	$ 100,886	-$ 65,065
44	19	$ 40,815	$ 110,655	-$ 69,840
45	20	$ 46,386	$ 120,924	-$ 74,539
46	21	$ 52,594	$ 131,720	-$ 79,125
47	22	$ 59,510	$ 143,068	-$ 83,557
48	23	$ 67,210	$ 154,997	-$ 87,787
49	24	$ 75,777	$ 167,537	-$ 91,760
50	25	$ 85,307	$ 180,720	-$ 95,413
51	26	$ 95,906	$ 194,578	-$ 98,672
52	27	$ 107,689	$ 209,146	-$ 101,456
53	28	$ 120,787	$ 224,459	-$ 103,672
54	29	$ 135,343	$ 240,558	-$ 105,214
55	30	$ 214,974	$ 257,480	-$ 42,506
56	31	$ 240,471	$ 275,270	-$ 34,799
57	32	$ 268,805	$ 293,970	-$ 25,166
58	33	$ 300,301	$ 313,629	-$ 13,328
59	34	$ 335,334	$ 334,294	$ 1,039
60	35	$ 374,325	$ 356,018	$ 18,307

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $14,746 (B). Her net pension wealth accrued at this point is -$14,746, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[8] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Be*ginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

NEWARK PUBLIC SCHOOLS (NEW JERSEY)

SUMMARY

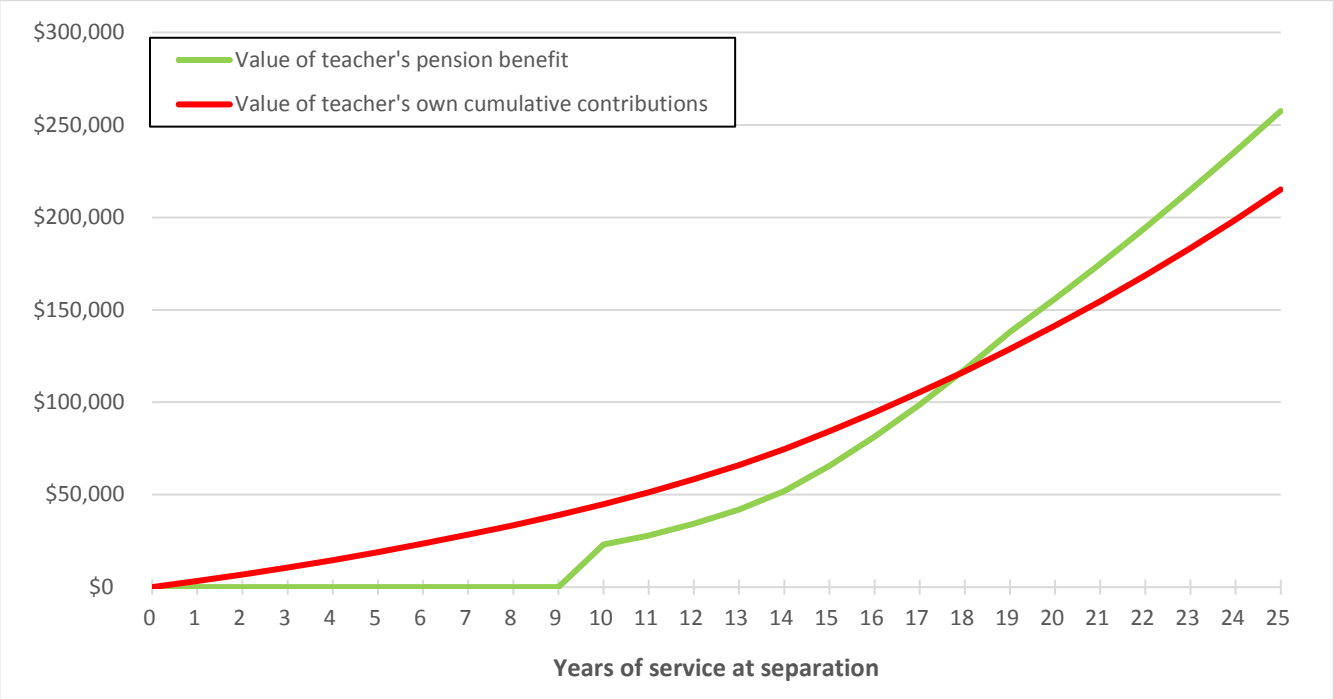
Newark Public Schools teachers enroll in a traditional defined benefit plan under the New Jersey Teachers' Pension and Annuity Fund. In Newark, the crossover point occurs after 18 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and one of the shortest in the group.[1]

About the District	
Students	34,976
Teachers (FTE)	3,057

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	150,205
Total members	239,905

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Newark Public Schools must remain in the pension system for 18 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Newark, a new teacher must stay 18 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Newark teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and at five years she has contributed $18,893 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 18,893	-$ 18,893
40	15	$ 65,606	$ 84,310	-$ 18,705
43	18	$ 117,808	$ 116,767	$ 1,041
50	25	$ 257,517	$ 215,094	$ 42,423

MID-CAREER

If she leaves the system with at least **10** years of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 65. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $65,606, but at this point she has contributed a total of $84,310. Not only has she not yet reached the crossover point, but her pension benefit is worth approximately $19,000 less than her cumulative contributions.

AT THE CROSSOVER

After 18 years, a Newark teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $116,767 into the system and can expect lifetime pension wealth accrual worth $117,808. Her net benefit becomes positive, though small ($1,041).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] After 25 years, a Newark teacher's net benefit is a modest $42,423. (Said another way, the red and green lines in Figure 1 remain close together even after the crossover point.)

Bottom line: New Jersey teachers who start at age 25 under the Newark Public Schools salary schedule must wait 18 years to reach the crossover point. Teachers who exit the New Jersey retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 18 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Newark Public Schools belong to a traditional defined benefit pension plan in the New Jersey Teachers' Pension and Annuity Fund.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 65/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): Any/30

Employer and employee contributions

- Employee contribution rate: 6.78 percent of salary
- Employer contribution rate: 25.04 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.67%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Newark teacher qualifies for full pension benefits at age 65 with 10 years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.67 percent. A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[9] The plan does offer reduced pension benefits for early retirement, available at any age with 30 years of service.

The employer contribution rate is set at 25.04 percent of earnings. The employee contribution rate is set at 6.78 percent of earnings.

Newark teachers do not pay into Social Security.

Assumptions for computing pension wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Survival probabilities from *2007 CDC Life Tables*[11]
- Teacher salary schedule for 2012–13 school year[12]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Newark Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,330	-$ 3,330
27	2	$ 0	$ 6,853	-$ 6,853
28	3	$ 0	$ 10,604	-$ 10,604
29	4	$ 0	$ 14,610	-$ 14,610
30	5	$ 0	$ 18,893	-$ 18,893
31	6	$ 0	$ 23,488	-$ 23,488
32	7	$ 0	$ 28,355	-$ 28,355
33	8	$ 0	$ 33,524	-$ 33,524
34	9	$ 0	$ 39,039	-$ 39,039
35	10	$ 23,018	$ 44,941	-$ 21,922
36	11	$ 27,898	$ 51,277	-$ 23,379
37	12	$ 34,221	$ 58,364	-$ 24,143
38	13	$ 41,977	$ 66,049	-$ 24,072
39	14	$ 51,904	$ 74,556	-$ 22,652
40	15	$ 65,606	$ 84,310	-$ 18,705
41	16	$ 81,462	$ 94,579	-$ 13,116
42	17	$ 98,679	$ 105,388	-$ 6,709
43	18	$ 117,808	$ 116,767	$ 1,041
44	19	$ 138,024	$ 128,745	$ 9,279
45	20	$ 155,987	$ 141,355	$ 14,633
46	21	$ 174,798	$ 154,628	$ 20,170
47	22	$ 194,410	$ 168,601	$ 25,808
48	23	$ 214,770	$ 183,310	$ 31,459
49	24	$ 235,825	$ 198,794	$ 37,030
50	25	$ 257,517	$ 215,094	$ 42,423

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $18,893 (B). Her net pension wealth accrued at this point is -$18,893, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

10 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

11 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

12 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

13 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

14 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

ALBUQUERQUE PUBLIC SCHOOLS (NEW MEXICO)

SUMMARY

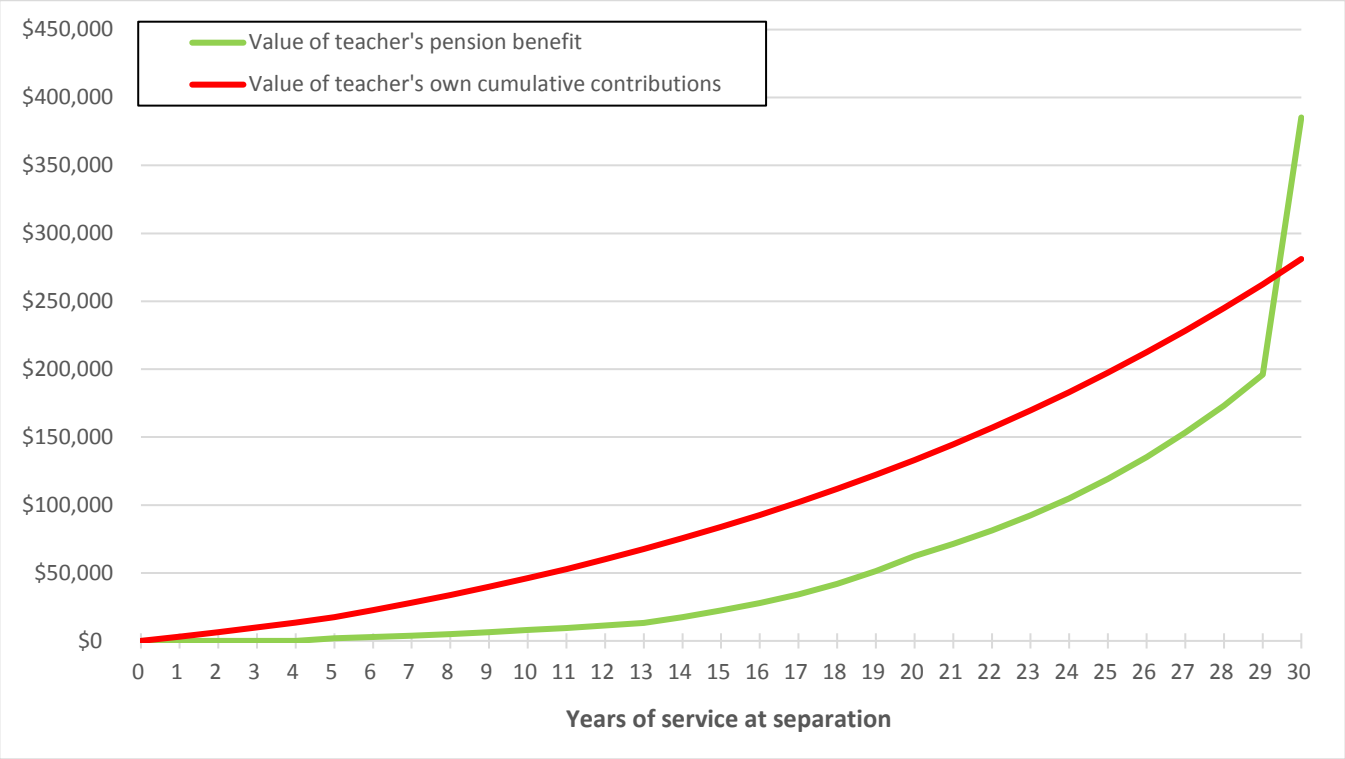
Albuquerque Public Schools teachers enroll in a traditional defined benefit plan administered by New Mexico Educational Retirement Board. In Albuquerque, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	93,202
Teachers (FTE)	6,185

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	98,512
Total members	161,020

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Albuquerque Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Albuquerque, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Albuquerque teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $9,920 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 9,920	-$ 9,920
40	15	$ 22,522	$ 83,919	-$ 61,397
50	25	$ 119,150	$ 197,464	-$ 78,314
55	30	$ 385,293	$ 281,112	$ 104,181

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $22,522, but at this point she has contributed a total of $83,919. Not only has she not yet reached the crossover point, but her pension wealth is worth barely one-quarter of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, an Albuquerque teacher still has not reached the crossover point, and the difference between the value of her contributions and her pension wealth is larger than it was mid-career. At this point, she's contributed $197,464 but would only expect to receive $119,150 in benefits.

AT THE CROSSOVER

After 30 years, an Albuquerque teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $281,112 into the system and can expect lifetime pension wealth accrual worth $385,293. Her net benefit becomes positive, and it's also quite large ($104,181) as her pension wealth grows late in her career.

Bottom line: New Mexico teachers who start at age 25 under the Albuquerque Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the New Mexico retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Albuquerque Public Schools belong to a traditional defined benefit plan administered by New Mexico Educational Retirement Board.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 67/5, any/30, and 65/(Rule of 80)
- Early retirement eligibility requirements for reduced benefits (age/years of service): any/(Rule of 80)

Employer and employee contributions

- Employee contribution rate: 10.7 percent of salary on annual earnings $20,000 or less; 7.9 percent of salary on annual earnings greater than $20,000
- Employer contribution rate: 13.9 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.35%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, an Albuquerque teacher qualifies for full pension benefits at age 67 with five years of service, any age with 30 years of service, or age 65 as long as the sum of age and years of service is 80 or more (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.35 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at any age as long as the sum of age and years of service is 80 or more.

The employer contribution rate is set at 13.9 percent of earnings. The employee contribution rate is set at 10.7 percent of annual earnings $20,000 or less, and 7.9 percent of annual earnings greater than $20,000. Albuquerque teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–-13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a

database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher Albuquerque Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,132	-$ 3,132
27	2	$ 0	$ 6,441	-$ 6,441
28	3	$ 0	$ 9,920	-$ 9,920
29	4	$ 0	$ 13,577	-$ 13,577
30	5	$ 2,006	$ 17,421	-$ 15,415
31	6	$ 2,791	$ 22,576	-$ 19,785
32	7	$ 3,748	$ 27,994	-$ 24,246
33	8	$ 4,903	$ 33,690	-$ 28,787
34	9	$ 6,312	$ 39,763	-$ 33,450
35	10	$ 8,002	$ 46,178	-$ 38,176
36	11	$ 9,545	$ 52,922	-$ 43,377
37	12	$ 11,319	$ 60,065	-$ 48,746
38	13	$ 13,327	$ 67,574	-$ 54,247
39	14	$ 17,400	$ 75,542	-$ 58,142
40	15	$ 22,522	$ 83,919	-$ 61,397
41	16	$ 27,824	$ 92,725	-$ 64,901
42	17	$ 34,126	$ 101,981	-$ 67,855
43	18	$ 41,993	$ 111,881	-$ 69,888
44	19	$ 51,285	$ 122,288	-$ 71,003
45	20	$ 62,380	$ 133,228	-$ 70,848
46	21	$ 71,346	$ 144,729	-$ 73,383
47	22	$ 81,287	$ 156,819	-$ 75,531
48	23	$ 92,370	$ 169,664	-$ 77,295
49	24	$ 104,767	$ 183,168	-$ 78,402
50	25	$ 119,150	$ 197,464	-$ 78,314
51	26	$ 135,278	$ 212,492	-$ 77,214
52	27	$ 153,351	$ 228,290	-$ 74,939
53	28	$ 173,185	$ 244,963	-$ 71,779
54	29	$ 195,985	$ 262,568	-$ 66,583
55	30	$ 385,293	$ 281,112	$ 104,181

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,006 (A) and her cumulative contributions are worth $17,421 (B). Her net pension wealth accrued at this point is -$15,415, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

NEW YORK CITY DEPARTMENT OF EDUCATION (NEW YORK)

SUMMARY

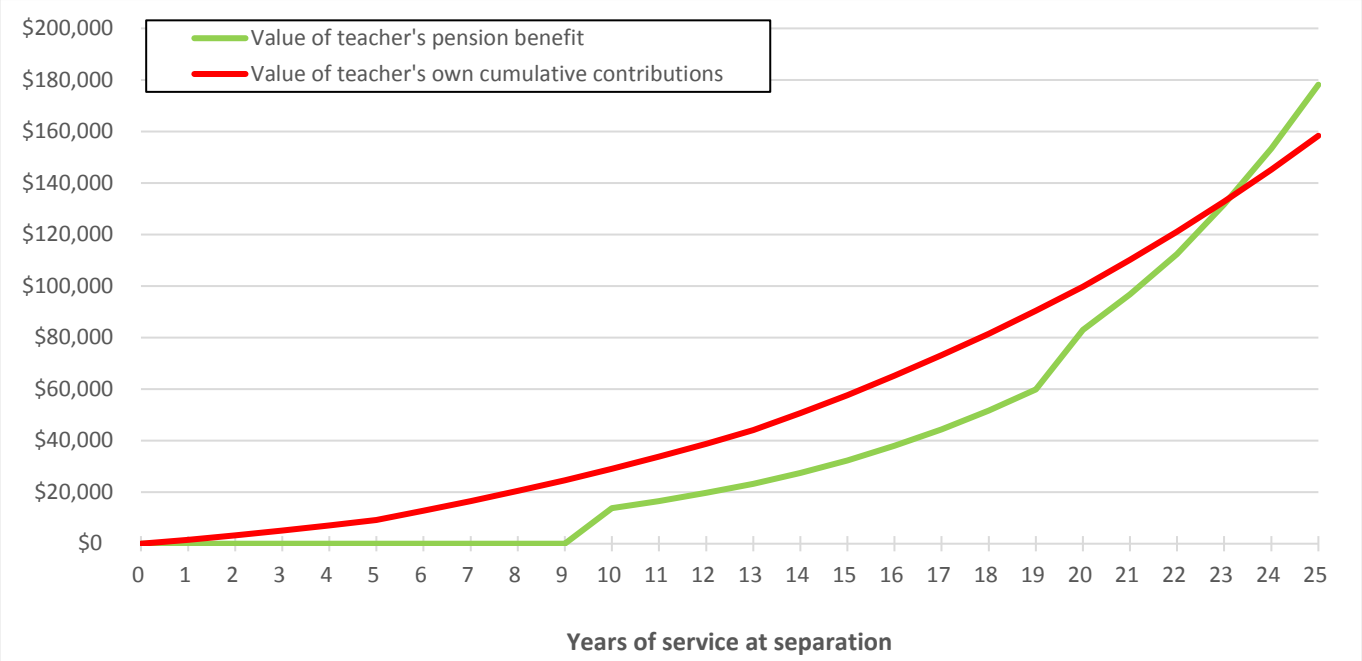
New York City Department of Education (DOE) teachers enroll in a traditional defined benefit plan under the Teachers' Retirement System of the City of New York. In New York City, the crossover point occurs after 24 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. While this is slightly shorter than the national median crossover point of 27 years for the defined benefit plans in this study, it is longer than the career of the majority of American teachers.[1]

About the District	
Students	966,332
Teachers (FTE)	61,502

About the Retirement Plan	
Type	Defined benefit
Coverage	Local teachers
Active members	112,481
Total members	192,900

Sources: Enrollment: NCES (2013–14). Retirement plan membership: 2014 Comprehensive Annual Financial Report for Teachers' Retirement System of the City of New York (membership as of June, 2014)

Figure 1: A new teacher in New York City must remain in the pension system for 24 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In New York City, a new teacher must stay 24 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A New York City teacher who leaves after **five years** of service (or at any point before the vesting point of 10 years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after five years she has contributed $9,197 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 0	$ 9,197	-$ 9,197
40	15	$ 32,326	$ 57,601	-$ 25,275
49	24	$ 153,413	$ 145,243	$ 8,170
50	25	$ 178,140	$ 158,318	$ 19,822

MID-CAREER

If she leaves the system with at least **10 years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches age 63. But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] Her pension wealth is $32,326, but at this point she has contributed a total of $57,601. Not only has she not yet reached the crossover point, but her pension wealth is worth $25,275 less than her cumulative contributions.

AT THE CROSSOVER

After 24 years, a New York City teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $145,243 into the system and can expect lifetime pension wealth accrual worth $153,413. Her net benefit becomes positive, though small ($8,170).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] After 25 years, a New York City teacher's net benefit is more than double what it was the year before, but still small ($19,822).

Bottom line: Teachers who start at age 25 under the New York City Department of Education salary schedule must wait 24 years to reach the crossover point. Teachers who exit the retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 24 years.[9]

TECHNICAL MATTERS

Retirement System

Teachers working for the New York City Department of Education belong to a traditional defined benefit pension plan in the Teachers' Retirement System of the City of New York.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): 63/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/10

Employer and employee contributions

- Employee contribution rate: depends on annual salary
- Employer contribution rate: 17.53 percent of salary
- Refundable contributions: employee contributions plus interest

Salary	Contribution rate
Less than $45,000	3%
$45,000-$54,999	3.5%
$55,000-$74,999	4.5%
$75,000-$99,999	5.75%
$100,000 or more	6%

Defined benefit formula

A new teacher's normal retirement benefit depends on how many years of service she has and is equal to the formula below:

Retiree with less than 20 years of service:

Annual benefit = (1.67%) x (YOS) x (FAS)

Retiree with 20 or more of service:

Annual benefit = (35%) x (FAS of first 20 years) + (2%) x (YOS exceeding 20 years) x (FAS of years exceeding 20)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a New York City teacher qualifies for full pension benefits at age 63 with 10 years of service. The annual benefit depends on years of service at retirement. If a teacher retires with less than 20 years, the annual benefit is equal to the teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 1.67 percent. If she retires with 20 or more years of service, the annual benefit is equal to 35 percent of the "final" average salary from her first 20 years, plus 2 percent of her final average salary times each year of service greater than 20. (In all cases, final average salary refers to the average of her five highest annual salaries.) A teacher vests into the pension system after 10 years—meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with 10 years of service.

The employer contribution rate is set at 17.53 percent of earnings. The employee contribution rate depends on that year's salary and ranges from 3 to 6 percent of earnings.

New York City teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]

- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the New York City Department of Education

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,555	-$ 1,555
27	2	$ 0	$ 3,292	-$ 3,292
28	3	$ 0	$ 5,136	-$ 5,136
29	4	$ 0	$ 7,103	-$ 7,103
30	5	$ 0	$ 9,197	-$ 9,197
31	6	$ 0	$ 12,760	-$ 12,760
32	7	$ 0	$ 16,513	-$ 16,513
33	8	$ 0	$ 20,468	-$ 20,468
34	9	$ 0	$ 24,635	-$ 24,635
35	10	$ 13,808	$ 29,026	-$ 15,218
36	11	$ 16,570	$ 33,788	-$ 17,217
37	12	$ 19,717	$ 38,805	-$ 19,088
38	13	$ 23,293	$ 44,092	-$ 20,799
39	14	$ 27,517	$ 50,670	-$ 23,153
40	15	$ 32,326	$ 57,601	-$ 25,275
41	16	$ 37,974	$ 65,154	-$ 27,180
42	17	$ 44,406	$ 73,111	-$ 28,706
43	18	$ 51,718	$ 81,496	-$ 29,778
44	19	$ 59,908	$ 90,396	-$ 30,487
45	20	$ 83,014	$ 99,773	-$ 16,758
46	21	$ 96,751	$ 110,136	-$ 13,386
47	22	$ 112,390	$ 121,056	-$ 8,666
48	23	$ 131,707	$ 132,834	-$ 1,127
49	24	$ 153,413	$ 145,243	$ 8,170
50	25	$ 178,140	$ 158,318	$ 19,822

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $0 (A) and her cumulative contributions are worth $9,197 (B). Her net pension wealth accrued at this point is -$9,197, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 Teachers may transfer years of service and member contributions from the New York City retirement system to the New York State system (https://www.nystrs.org/NYSTRS/media/PDF/Library/Publications/Active%20Members/handbook.pdf#page=17). Teachers who are transferring into the New York City system from elsewhere in the state can receive credit for prior service with another public employer in New York State, but new teachers must purchase this credit (https://trsnyc.org/ASPENMemberPro/Account/faqinservicemember).

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

WAKE COUNTY PUBLIC SCHOOL SYSTEM (NORTH CAROLINA)

SUMMARY

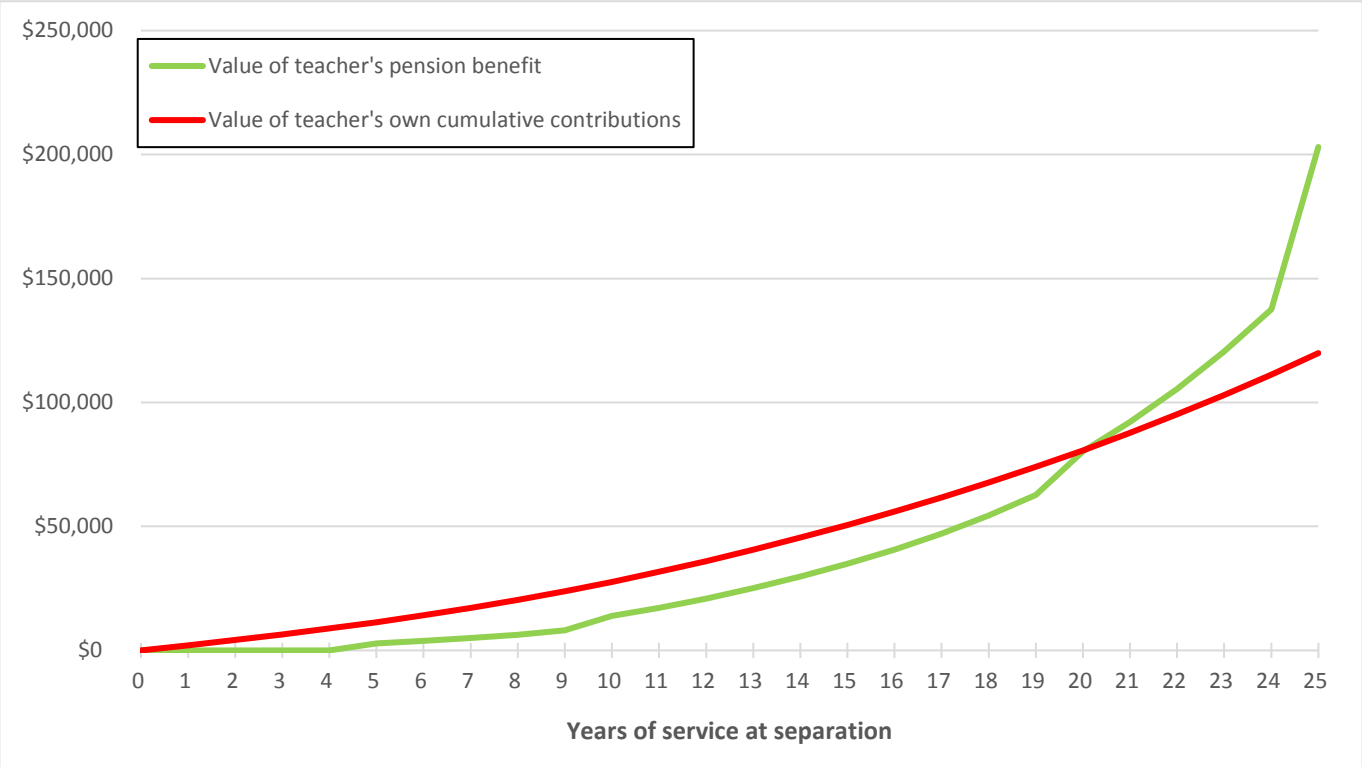
Wake County Public School System teachers enroll in a traditional defined benefit plan under the North Carolina Teachers' and State Employees' Retirement System. In Wake County, the crossover point occurs after 21 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than her cumulative contributions. This is shorter than the national median crossover point of 27 years for the defined benefit plans in this study, but still longer than the career of the majority of American teachers.[1]

About the District	
Students	153,534
Teachers (FTE)	9,869

About the Retirement Plan	
Type	Defined benefit
Coverage	All public employees
Active members	317,906
Total members	600,378

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of December, 2011; includes all public employee members)

Figure 1: A new teacher in Wake County must remain in the pension system for 21 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Wake County, a new teacher must stay 21 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Wake County teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $6,470 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 6,470	-$ 6,470
40	15	$ 34,949	$ 50,599	-$ 15,650
46	21	$ 92,128	$ 87,755	$ 4,373
50	25	$ 203,044	$ 119,912	$ 83,132

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $34,949, but at this point she has contributed a total of $50,599. Not only has she not yet reached the crossover point, but her pension wealth is worth nearly $16,000 less than her cumulative contributions.

AT THE CROSSOVER

After 21 years, a Wake County teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $87,755 into the system and can expect lifetime pension wealth accrual worth $92,128. Her net benefit becomes positive, though small ($4,373).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Wake County teacher has a modest net benefit of $83,132.

Bottom line: North Carolina teachers who start at age 25 under the Wake County Public School System salary schedule must wait 21 years to reach the crossover point. Teachers who exit the North Carolina retirement system early are disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 21 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Wake County Public School System belong to a traditional defined benefit pension plan in the North Carolina Teachers' and State Employees' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5, 60/25, and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 60/5 and 50/20

Employer and employee contributions

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: 8.69 percent of salary
- Refundable contributions: employee contributions, with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.82%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the four highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Wake County teacher qualifies for full pension benefits at any age with 30 years of service, age 60 with 25 years of service, or age 65 with five years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final four years, times an accrual factor of 1.82 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 50 with 20 years of service or age 60 with five years of service, whichever comes first.

The employer contribution rate is set at 8.69 percent of earnings. The employee contribution rate is set at 6 percent of earnings. Wake County teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Wake County Public School System

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,060	-$ 2,060
27	2	$ 0	$ 4,215	-$ 4,215
28	3	$ 0	$ 6,470	-$ 6,470
29	4	$ 0	$ 8,830	-$ 8,830
30	5	$ 2,882	$ 11,299	-$ 8,417
31	6	$ 3,827	$ 14,129	-$ 10,302
32	7	$ 4,953	$ 17,124	-$ 12,171
33	8	$ 6,347	$ 20,369	-$ 14,022
34	9	$ 8,075	$ 23,870	-$ 15,794
35	10	$ 13,908	$ 27,632	-$ 13,724
36	11	$ 17,170	$ 31,708	-$ 14,538
37	12	$ 20,921	$ 36,052	-$ 15,131
38	13	$ 25,147	$ 40,647	-$ 15,500
39	14	$ 29,852	$ 45,491	-$ 15,639
40	15	$ 34,949	$ 50,599	-$ 15,650
41	16	$ 40,670	$ 56,004	-$ 15,335
42	17	$ 47,094	$ 61,699	-$ 14,605
43	18	$ 54,413	$ 67,710	-$ 13,296
44	19	$ 62,674	$ 74,040	-$ 11,366
45	20	$ 80,295	$ 80,706	-$ 411
46	21	$ 92,128	$ 87,755	$ 4,373
47	22	$ 105,374	$ 95,174	$ 10,200
48	23	$ 120,523	$ 103,005	$ 17,518
49	24	$ 137,600	$ 111,245	$ 26,355
50	25	$ 203,044	$ 119,912	$ 83,132

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,882 (A) and her cumulative contributions are worth $11,299 (B). Her net pension wealth accrued at this point is -$8,417, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html)

BISMARK PUBLIC SCHOOL DISTRICT (NORTH DAKOTA)

SUMMARY

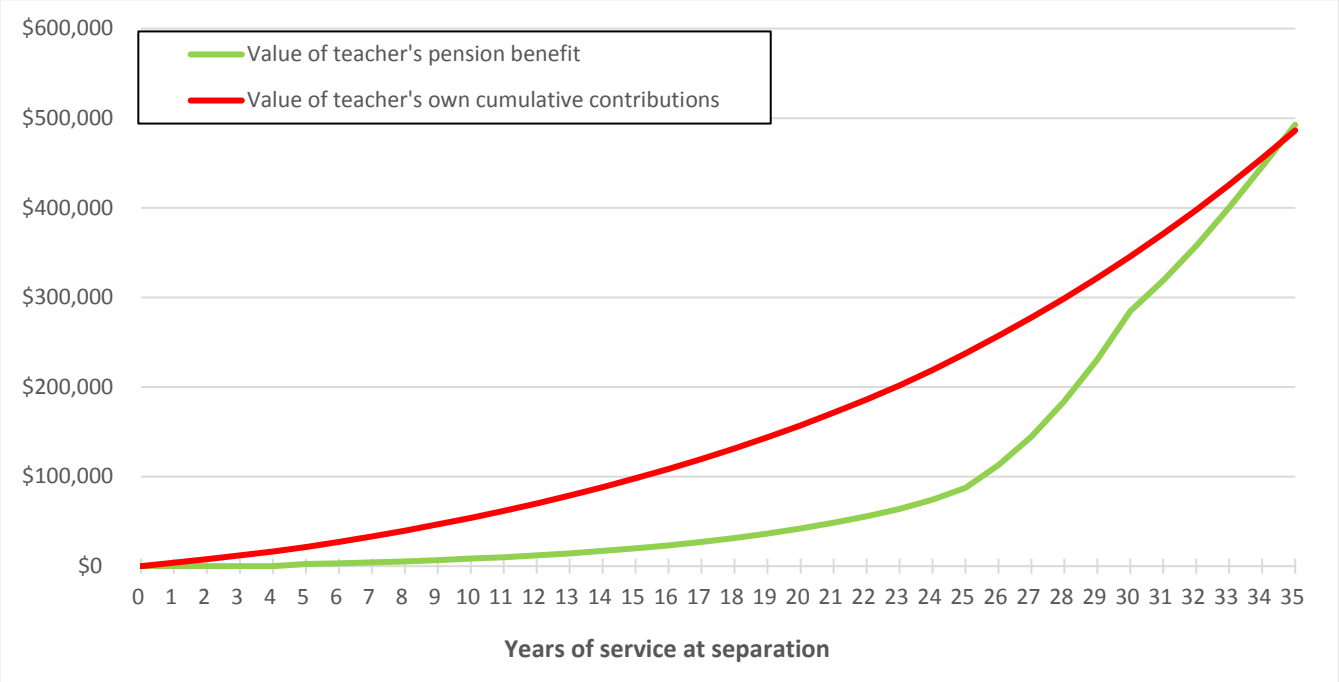
A new Bismarck Public School District teacher enrolls in a traditional defined benefit plan under the North Dakota Teacher's Fund for Retirement. In Bismarck, the crossover point occurs after 35 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	12,012
Teachers (FTE)	780

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	10,014
Total members	19,116

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of July, 2012)

Figure 1: A new teacher in the Bismarck Public School District must remain in the pension system for 35 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Bismarck, a new teacher must stay 35 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Bismarck teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $11,949 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 11,949	-$ 11,949
40	15	$ 19,863	$97,965	-$ 78,102
50	25	$ 87,301	$ 237,445	-$ 150,144
60	35	$ 492,667	$ 486,300	$ 6,367

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $19,863, but at this point she has contributed a total of $97,965. Not only has she not yet reached the crossover point, but her pension wealth is worth only about one-fifth of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Bismarck teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is even greater than it was mid-career. At this point, she's contributed $237,445 but would only expect to receive $87,301 in benefits.

AT THE CROSSOVER

After 35 years, a Bismarck teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $486,300 into the system and can expect lifetime pension wealth accrual worth $492,667. Her net benefit becomes positive, though small ($6,367).

Bottom line: North Dakota teachers who start at age 25 under the Bismarck Public School District salary schedule must wait 35 years to reach the crossover point. Teachers who exit the North Dakota retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 35 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Bismarck Public School District belong to a traditional defined benefit pension plan in the North Dakota Teacher's Fund for Retirement.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 60/(Rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions

- Employee contribution rate: 11.75 percent of salary
- Employer contribution rate: 12.75 percent of salary
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Bismarck teacher qualifies for full pension benefits at age 65 with five years of service, or at age 60 as long as the sum of age and years of service is 90 or more (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service.

The employer contribution rate is set at 12.75 percent of earnings. The employee contribution rate is set at 11.75 percent of earnings.

Bismarck teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Bismarck Public School District

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,710	-$ 3,710
27	2	$ 0	$ 7,683	-$ 7,683
28	3	$ 0	$ 11,949	-$ 11,949
29	4	$ 0	$ 16,523	-$ 16,523
30	5	$ 2,328	$ 21,422	-$ 19,095
31	6	$ 3,153	$ 27,120	-$ 23,967
32	7	$ 4,144	$ 33,193	-$ 29,049
33	8	$ 5,322	$ 39,662	-$ 34,340
34	9	$ 6,712	$ 46,548	-$ 39,836
35	10	$ 8,343	$ 53,873	-$ 45,531
36	11	$ 10,068	$ 61,662	-$ 51,594
37	12	$ 12,048	$ 69,939	-$ 57,891
38	13	$ 14,315	$ 78,729	-$ 64,414
39	14	$ 16,906	$ 88,062	-$ 71,155
40	15	$ 19,863	$ 97,965	-$ 78,102
41	16	$ 23,232	$ 108,469	-$ 85,237
42	17	$ 27,064	$ 119,607	-$ 92,543
43	18	$ 31,420	$ 131,414	-$ 99,995
44	19	$ 36,366	$ 143,927	-$ 107,561
45	20	$ 41,979	$ 157,183	-$ 115,204
46	21	$ 48,343	$ 171,224	-$ 122,881
47	22	$ 55,554	$ 186,091	-$ 130,538
48	23	$ 63,791	$ 201,862	-$ 138,071
49	24	$ 74,280	$ 218,986	-$ 144,706
50	25	$ 87,301	$ 237,445	-$ 150,144
51	26	$ 112,719	$ 256,895	-$ 144,176
52	27	$ 144,618	$ 277,388	-$ 132,770
53	28	$ 184,213	$ 298,981	-$ 114,768
54	29	$ 230,554	$ 321,733	-$ 91,179
55	30	$ 284,532	$ 345,705	-$ 61,173
56	31	$ 319,018	$ 370,964	-$ 51,946
57	32	$ 357,434	$ 397,578	-$ 40,144
58	33	$ 400,242	$ 425,620	-$ 25,379
59	34	$ 446,097	$ 455,167	-$ 9,070
60	35	$ 492,667	$ 486,300	$ 6,367

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,328 (A) and her cumulative contributions are worth $21,422 (B). Her net pension wealth accrued at this point is -$19,095, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

OKLAHOMA CITY PUBLIC SCHOOLS (OKLAHOMA)

SUMMARY

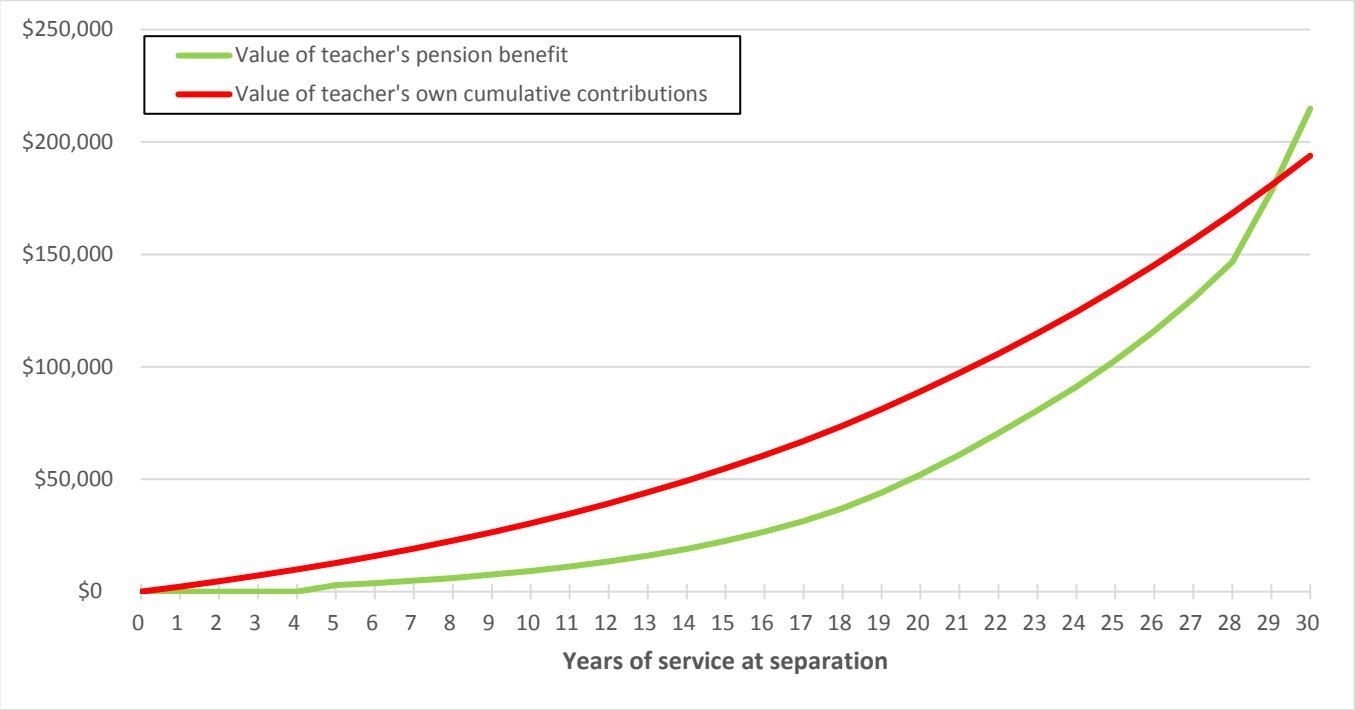
Oklahoma City Public Schools teachers enroll in a traditional defined benefit plan under the Oklahoma Teachers Retirement System. In Oklahoma City, the crossover point occurs after 30 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	40,913
Teachers (FTE)	2,415

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	87,788
Total members	157,745

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Oklahoma City Public Schools must remain in the pension system for 30 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Oklahoma City, a new teacher must stay 30 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Oklahoma City teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $7,170 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 7,170	-$ 7,170
40	15	$ 22,602	$ 54,838	-$ 32,236
50	25	$ 102,823	$ 134,633	-$ 31,810
55	30	$ 214,832	$ 193,879	$ 20,954

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative--and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $22,602, but at this point she has contributed a total of $54,838. Not only has she not yet reached the crossover point, but her pension wealth is worth only about half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, an Oklahoma City teacher still has not reached the crossover point, and the difference between her contributions and pension wealth is still about the same as it was mid-career. At this point, she's contributed $134,633 but would only expect to receive $102,823 in benefits.

AT THE CROSSOVER

After 30 years, an Oklahoma City teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $193,879 into the system and can expect lifetime pension wealth accrual worth $214,832. Her net benefit becomes positive ($20,954).

Bottom line: Oklahoma teachers who start at age 25 under the Oklahoma City Public Schools salary schedule must wait 30 years to reach the crossover point. Teachers who exit the Oklahoma retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 30 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Oklahoma City Public Schools belong to a traditional defined benefit pension plan in the Oklahoma Teachers Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 60/(Rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 60/5

Employer and employee contributions

- Employee contribution rate: 7.0 percent of salary
- Employer contribution rate: 17.2 percent of salary (9.3 percent by the district and 7.9 percent by the state)
- Refundable contributions: employee contributions with interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, an Oklahoma City teacher qualifies for full pension benefits at age 65 with five years of service, or age 60 as long as the sum of age and years of service is 90 or more (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 60 with five years of service.

The employer contribution rate is set at 17.2 percent of earnings (the district contributes 9.3 percent of earnings, and the state 7.9 percent). The employee contribution rate is set at 7.0 percent of earnings.

Oklahoma City teachers do pay into Social Security.

Assumptions for computing pension wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Oklahoma City Public Schools

Age	Years of Service	Value of teacher's pension benefits (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,249	-$ 2,249
27	2	$ 0	$ 4,635	-$ 4,635
28	3	$ 0	$ 7,170	-$ 7,170
29	4	$ 0	$ 9,861	-$ 9,861
30	5	$ 2,869	$ 12,738	-$ 9,868
31	6	$ 3,783	$ 15,857	-$ 12,074
32	7	$ 4,855	$ 19,179	-$ 14,324
33	8	$ 6,108	$ 22,713	-$ 16,605
34	9	$ 7,559	$ 26,456	-$ 18,897
35	10	$ 9,222	$ 30,422	-$ 21,199
36	11	$ 11,142	$ 34,688	-$ 23,546
37	12	$ 13,389	$ 39,257	-$ 25,868
38	13	$ 16,016	$ 44,140	-$ 28,125
39	14	$ 19,072	$ 49,332	-$ 30,261
40	15	$ 22,602	$ 54,838	-$ 32,236
41	16	$ 26,676	$ 60,734	-$ 34,058
42	17	$ 31,356	$ 67,021	-$ 35,665
43	18	$ 37,074	$ 73,851	-$ 36,777
44	19	$ 44,061	$ 81,234	-$ 37,173
45	20	$ 51,999	$ 89,013	-$ 37,013
46	21	$ 60,776	$ 97,209	-$ 36,433
47	22	$ 70,495	$ 105,844	-$ 35,350
48	23	$ 80,635	$ 114,944	-$ 34,309
49	24	$ 91,125	$ 124,531	-$ 33,407
50	25	$ 102,823	$ 134,633	-$ 31,810
51	26	$ 115,866	$ 145,277	-$ 29,411
52	27	$ 130,403	$ 156,492	-$ 26,089
53	28	$ 146,604	$ 168,309	-$ 21,705
54	29	$ 178,054	$ 180,760	-$ 2,706
55	30	$ 214,832	$ 193,879	$ 20,954

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,869 (A) and her cumulative contributions are worth $12,738 (B). Her net pension wealth accrued at this point is -$9,868, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

SCHOOL DISTRICT OF PHILADELPHIA (PENNSYLVANIA)

SUMMARY

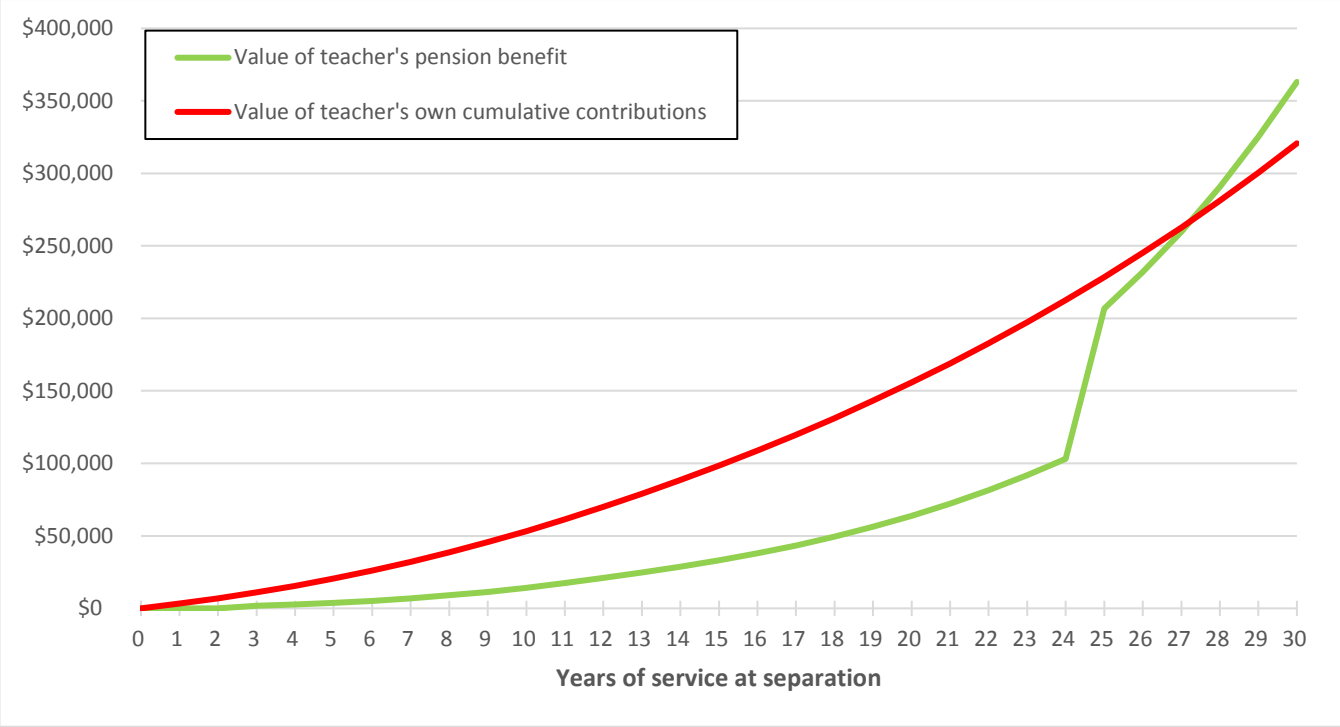
School District of Philadelphia teachers enroll in a traditional defined benefit plan under the Pennsylvania Public School Employees' Retirement System. In Philadelphia, the crossover point occurs after 28 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is even longer than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	137,674
Teachers (FTE)	7,646

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	267,428
Total members	495,543

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2013)

Figure 1: A new teacher in the School District of Philadelphia must remain in the pension system for 28 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Philadelphia, a new teacher must stay 28 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Philadelphia teacher who leaves after **two years** of service (or at any point before vesting) is not eligible to receive pension benefits at all, because she has not vested (Table 1).[6] Her pension wealth is zero, and after two years she has contributed $6,940 into the retirement system.[7] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is her pension wealth? How much has she contributed? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
27	2	$ 0	$ 6,940	-$ 6,940
40	15	$ 33,035	$ 98,434	-$ 65,399
50	25	$ 206,802	$ 228,457	-$ 21,655
53	28	$ 290,779	$ 281,163	$ 9,616

MID-CAREER

After a teacher vests, she is eligible to start receiving pension benefits once she reaches retirement age.[8] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her pension wealth is $33,035, but at this point she has contributed a total of $98,434. Not only has she not yet reached the crossover point, but her pension wealth is only about one-third of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] But even after 25 years, a Philadelphia teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $228,457 but would only expect to receive $206,802 in benefits.

AT THE CROSSOVER

After 28 years, a Philadelphia teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $281,163 into the system and can expect lifetime pension wealth accrual worth $290,779. Her net benefit becomes positive, though modest ($9,616). The net benefit increases thereafter—after two more years it will be $42,341.

Bottom line: Pennsylvania teachers who start at age 25 under the School District of Philadelphia salary schedule must wait 28 years to reach the crossover point. Teachers who exit the Pennsylvania retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 28 years.

TECHNICAL MATTERS

Retirement System

Teachers working the School District of Philadelphia belong to a traditional defined benefit pension plan in the Pennsylvania Public School Employees' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: 10 years if retire prior to age 65; 3 years if retire at age 65 or older
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/3 and (Rule of 92)/35
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/25

Employer and employee contributions

- Employee contribution rate: 7.5 percent of salary
- Employer contribution rate: 25.84 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.5%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Philadelphia teacher qualifies for full pension benefits at age 65 with three years of service or at any age with 35 years of service, as long as the sum of age and years of service is at least 92, whichever comes first. The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final three years, times an accrual factor of 2.5 percent. A teacher vests into the pension system after three years if she retires at age 65 or older, or after ten years if she retires before age 65—meaning after either three or 10 years of service (depending on retirement age) she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[11] The plan does offer reduced pension benefits for early retirement, available at age 55 with 25 years of service.

The employer contribution rate is set at 25.84 percent of earnings. The employee contribution rate is set at 7.5 percent of earnings. Philadelphia teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[12]
- Survival probabilities from *2007 CDC Life Tables*[13]
- Teacher salary schedule for 2012–13 school year[14]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[15] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[16]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the School District of Philadelphia

Age	Years of service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A)-(B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,319	-$ 3,319
27	2	$ 0	$ 6,940	-$ 6,940
28	3	$ 1,723	$ 11,019	-$ 9,296
29	4	$ 2,626	$ 15,534	-$ 12,908
30	5	$ 3,765	$ 20,496	-$ 16,731
31	6	$ 5,196	$ 26,059	-$ 20,863
32	7	$ 6,924	$ 32,095	-$ 25,172
33	8	$ 8,985	$ 38,621	-$ 29,636
34	9	$ 11,331	$ 45,668	-$ 34,337
35	10	$ 14,100	$ 53,270	-$ 39,171
36	11	$ 17,371	$ 61,464	-$ 44,093
37	12	$ 20,930	$ 70,057	-$ 49,127
38	13	$ 24,716	$ 79,069	-$ 54,353
39	14	$ 28,646	$ 88,521	-$ 59,875
40	15	$ 33,035	$ 98,434	-$ 65,399
41	16	$ 37,932	$ 108,830	-$ 70,898
42	17	$ 43,390	$ 119,734	-$ 76,343
43	18	$ 49,470	$ 131,169	-$ 81,699
44	19	$ 56,236	$ 143,162	-$ 86,926
45	20	$ 63,763	$ 155,741	-$ 91,978
46	21	$ 72,130	$ 168,933	-$ 96,803
47	22	$ 81,425	$ 182,768	-$ 101,343
48	23	$ 91,746	$ 197,278	-$ 105,532
49	24	$ 103,202	$ 212,496	-$ 109,294
50	25	$ 206,802	$ 228,457	-$ 21,655
51	26	$ 231,955	$ 245,196	-$ 13,241
52	27	$ 259,850	$ 262,751	-$ 2,901
53	28	$ 290,779	$ 281,163	$ 9,616
54	29	$ 325,065	$ 300,473	$ 24,592
55	30	$ 363,067	$ 320,725	$ 42,341

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,765 (A) and her cumulative contributions are worth $20,496 (B). Her net pension wealth accrued at this point is -$16,731, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 The vesting period depends on the teacher's age; teachers who retire prior to age 65 need at least 10 years of service in order to be fully vested. However, should a teacher retire at age 65 or older, she only needs three years of service for vesting.

7 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

8 Retirement age depends on years of service; see the "Technical Matters" section for more.

9 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

10 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

11 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

12 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

13 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

14 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

15 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

16 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html)

SIOUX FALLS SCHOOL DISTRICT (SOUTH DAKOTA)

SUMMARY

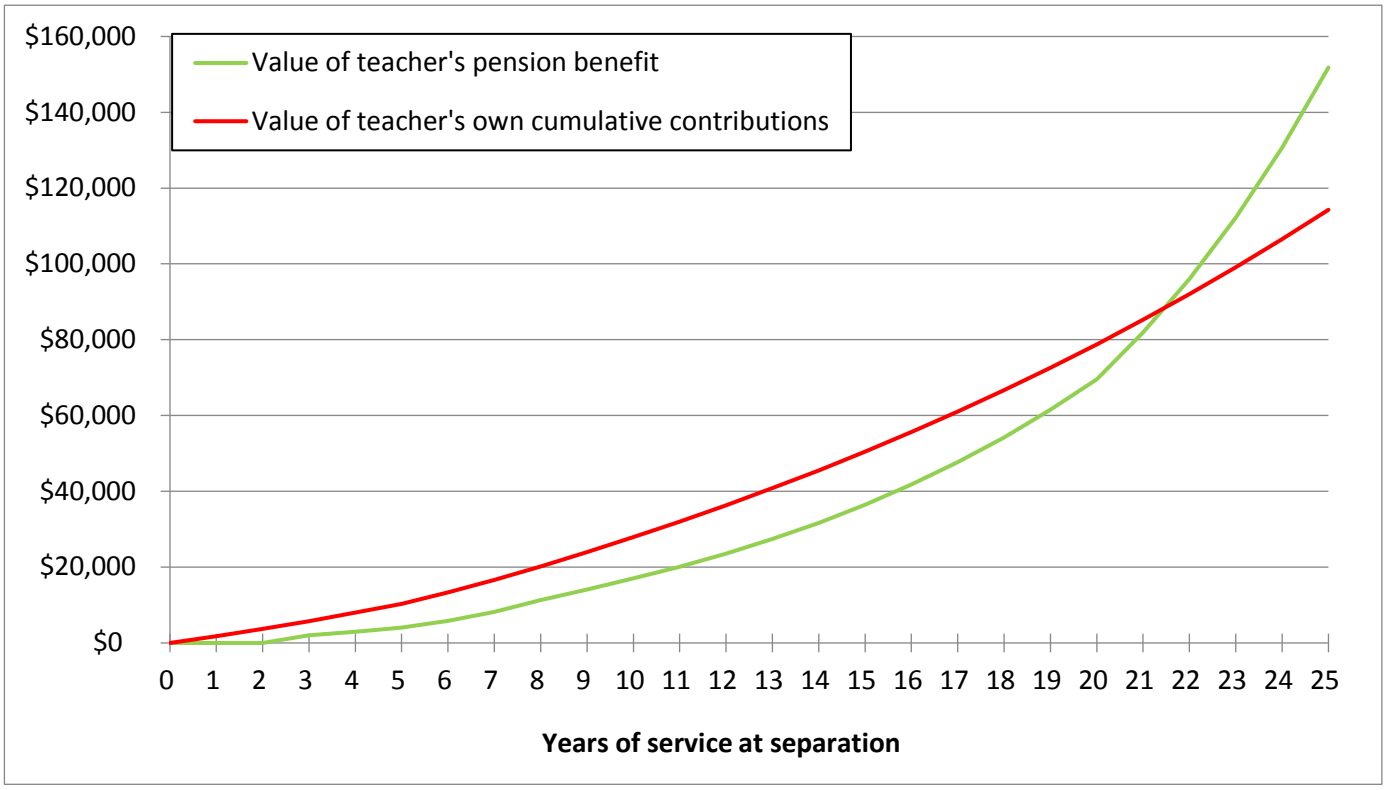
Sioux Falls School District teachers enroll in a traditional defined benefit plan under the South Dakota Retirement System. In Sioux Falls, the crossover point occurs after 22 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. While this is slightly shorter than the national median crossover point of 27 years for the defined benefit plans in this study, it is longer than the career of the majority of American teachers.[1]

About the District	
Students	23,384
Teachers (FTE)	1,472

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	38,207
Total members	75,368

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in Sioux Falls must remain in the pension system for 22 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Sioux Falls, a new teacher must stay 22 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Sioux Falls teacher who leaves after **two years** of service (or at any point before the vesting point of three years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after two years she has contributed $3,720 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
27	2	$ 0	$ 3,720	-$ 3,720
40	15	$ 36,471	$ 50,471	-$ 14,001
47	22	$ 96,021	$ 92,017	$ 4,003
50	25	$ 151,812	$ 114,273	$ 37,539

MID-CAREER

If she leaves the system with at least **three years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] This is one of the shortest vesting periods of the plans in this study. But after vesting at three years, her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $36,471, but at this point she has contributed a total of $50,471. Not only has she not yet reached the crossover point, but her pension wealth is worth about $14,000 less than her cumulative contributions.

AT THE CROSSOVER

After 22 years, a Sioux Falls teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $92,017 into the system and can expect lifetime pension wealth accrual worth $96,021. Her net benefit becomes positive, though small ($4,003).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Sioux Falls teacher's net benefit is $37,539 and will continue to grow the longer she stays.

Bottom line: South Dakota teachers who start at age 25 under the Sioux Falls School District salary schedule must wait 22 years to reach the crossover point. Teachers who exit the South Dakota retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 22 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Sioux Falls School District belong to a traditional defined benefit pension plan in the South Dakota Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Three years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/3 and 55/(Rule of 85)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/3

Employer and employee contributions

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: 6 percent of salary
- Refundable contributions: Employee contributions plus interest, and some employer contributions plus interest (vested members receive 85 percent of employer contributions, plus credited interest, and non-vested members receive 50 percent of employer contributions, plus credited interest)

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.55%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Sioux Falls teacher qualifies for full pension benefits at age 65 with three years of service, or if she is at least age 55 and the sum of her age and years of service is at least 85 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 1.55 percent. A teacher vests into the pension system after three years—meaning after three years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with three years of service.

Unique to this system is its Portable Retirement Option for refunds. Should a teacher opt for a refund rather than a pension, she not only receives her own contributions plus interest, but also a portion of the employer's contributions (85 percent plus credited interest if she is vested; 50 percent plus credited interest if she is not). Table 2 shows the refund amount over the course of a teacher's career, and how taking the refund into account affects a teacher's net benefit.

The employer contribution rate is set at 6 percent of earnings. The employee contribution rate is set at 6 percent of earnings. Sioux Falls teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Sioux Falls School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Total refund (C)	Net benefit *without* considering refund (A)-(B)	Net benefit accounting for refund (Maximum of A and C)-(B)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,796	$ 2,694	-$ 1,796	$ 898
27	2	$ 0	$ 3,720	$ 5,389	-$ 3,720	$ 1,670
28	3	$ 2,036	$ 5,779	$ 9,976	-$ 3,743	$ 4,197
29	4	$ 2,986	$ 7,981	$ 13,311	-$ 4,995	$ 5,330
30	5	$ 4,070	$ 10,285	$ 16,564	-$ 6,215	$ 6,280
31	6	$ 5,866	$ 13,320	$ 20,895	-$ 7,454	$ 7,575
32	7	$ 8,207	$ 16,624	$ 25,356	-$ 8,417	$ 8,733
33	8	$ 11,290	$ 20,215	$ 29,958	-$ 8,925	$ 9,743
34	9	$ 14,070	$ 23,973	$ 34,447	-$ 9,903	$ 10,475
35	10	$ 17,044	$ 27,904	$ 38,827	-$ 10,860	$ 10,923
36	11	$ 20,126	$ 32,018	$ 43,101	-$ 11,893	$ 11,082
37	12	$ 23,570	$ 36,323	$ 47,270	-$ 12,753	$ 10,947
38	13	$ 27,414	$ 40,827	$ 51,338	-$ 13,414	$ 10,511
39	14	$ 31,699	$ 45,540	$ 55,307	-$ 13,841	$ 9,767
40	15	$ 36,471	$ 50,471	$ 59,180	-$ 14,001	$ 8,708
41	16	$ 41,780	$ 55,631	$ 62,958	-$ 13,851	$ 7,327
42	17	$ 47,680	$ 61,030	$ 66,644	-$ 13,350	$ 5,614
43	18	$ 54,234	$ 66,679	$ 70,240	-$ 12,445	$ 3,561
44	19	$ 61,509	$ 72,590	$ 73,749	-$ 11,081	$ 1,159
45	20	$ 69,580	$ 78,775	$ 77,173	-$ 9,195	-$ 1,602
46	21	$ 81,892	$ 85,246	$ 80,513	-$ 3,354	-$ 3,354
47	22	$ 96,021	$ 92,017	$ 83,771	$ 4,003	$ 4,003
48	23	$ 112,201	$ 99,103	$ 86,951	$ 13,099	$ 13,099
49	24	$ 130,699	$ 106,516	$ 90,053	$ 24,183	$ 24,183
50	25	$ 151,812	$ 114,273	$ 93,080	$ 37,539	$ 37,539
51	26	$ 175,877	$ 122,389	$ 96,033	$ 53,487	$ 53,487
52	27	$ 203,270	$ 130,882	$ 98,914	$ 72,388	$ 72,388
53	28	$ 234,417	$ 139,768	$ 101,725	$ 94,649	$ 94,649
54	29	$ 269,792	$ 149,066	$ 104,467	$ 120,726	$ 120,726
55	30	$ 309,929	$ 158,795	$ 107,143	$ 151,135	$ 151,135
56	31	$ 315,773	$ 168,975	$ 109,753	$ 146,799	$ 146,799
57	32	$ 321,149	$ 179,626	$ 112,301	$ 141,523	$ 141,523
58	33	$ 326,043	$ 190,771	$ 114,786	$ 135,272	$ 135,272
59	34	$ 330,443	$ 202,432	$ 117,210	$ 128,011	$ 128,011
60	35	$ 334,340	$ 214,634	$ 119,576	$ 119,706	$ 119,706

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,070 (A) and her cumulative contributions are worth $10,285 (B). Her net pension wealth accrued at this point is -$6,215, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

HOUSTON INDEPENDENT SCHOOL DISTRICT (TEXAS)

SUMMARY

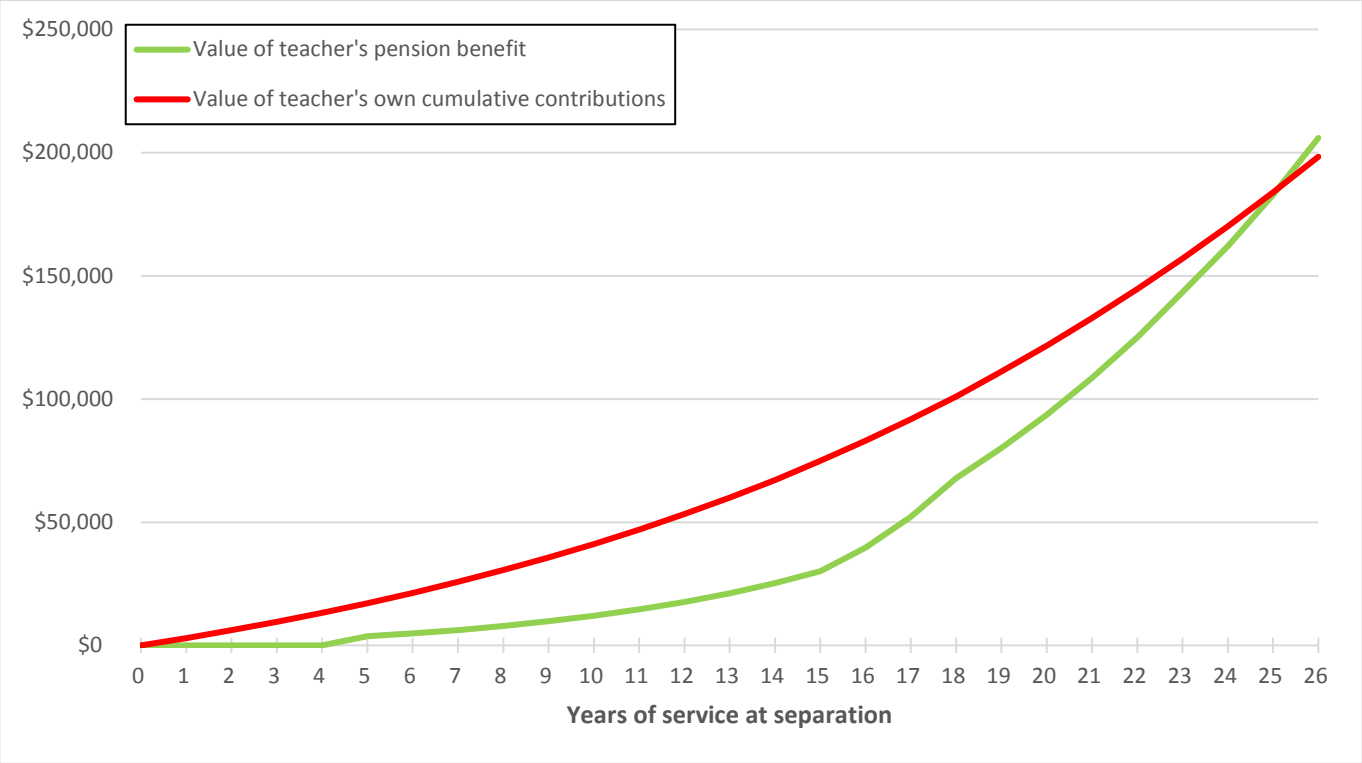
Houston Independent School District teachers enroll in a traditional defined benefit plan under the Teacher Retirement System of Texas. In Houston, the crossover point occurs after 26 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is just one year shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	211,552
Teachers (FTE)	11,337

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	815,155
Total members	1,335,402

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of August, 2012)

Figure 1: A new teacher in the Houston Independent School District must remain in the pension system for 26 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Houston, a new teacher must stay 26 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Houston teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $9,586 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 9,586	-$ 9,586
40	15	$ 30,024	$ 74,831	-$ 44,807
50	25	$ 182,764	$ 183,824	-$ 1,060
51	26	$ 205,947	$ 198,325	$ 7,622

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $30,024, but at this point she has contributed a total of $74,831. Not only has she not yet reached the crossover point, but her pension wealth is worth significantly less than half her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Houston teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $183,824 but would only expect to receive $182,764 in benefits.

AT THE CROSSOVER

After 26 years, a Houston teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $198,325 into the system and can expect lifetime pension wealth accrual worth $205,947. Her net benefit becomes positive, though small ($7,622).

Bottom line: Texas teachers who start at age 25 under the Houston Independent School District salary schedule must wait 26 years to reach the crossover point. Teachers who exit the Texas retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 26 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Houston Independent School District belong to a traditional defined benefit pension plan in the Teacher Retirement System of Texas.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 62/(Rule of 80)
- Early retirement eligibility requirements for reduced benefits (age/years of service):
  - If Rule of 80 is not satisfied and they are between 55 and 64 years of age, or
  - If Rule of 80 is not satisfied and they have 30 or more years of service, or
  - If Rule of 80 is satisfied but they are less than 62 years of age
    (amount of benefit reduction depends on which condition is met)

Employer and employee contributions

- Employee contribution rate: 7.70 percent of salary
- Employer contribution rate: 7.76 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.30%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Houston teacher qualifies for full pension benefits at age 65 with five years of service or age 62 as long as the sum of their age and years of service is at least 80 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 2.3 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement; availability is conditional on meeting one of three requirements.

The employer contribution rate is set at 7.76 percent of earnings. The employee contribution rate is set at 7.0 percent of earnings.

Houston teachers do not pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Houston Independent School District

Age	Years of service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,999	-$ 2,999
27	2	$ 0	$ 6,190	-$ 6,190
28	3	$ 0	$ 9,586	-$ 9,586
29	4	$ 0	$ 13,198	-$ 13,198
30	5	$ 3,655	$ 17,039	-$ 13,384
31	6	$ 4,835	$ 21,251	-$ 16,416
32	7	$ 6,237	$ 25,778	-$ 19,541
33	8	$ 7,874	$ 30,577	-$ 22,703
34	9	$ 9,781	$ 35,672	-$ 25,891
35	10	$ 12,066	$ 41,175	-$ 29,109
36	11	$ 14,618	$ 47,007	-$ 32,389
37	12	$ 17,593	$ 53,269	-$ 35,677
38	13	$ 21,110	$ 59,978	-$ 38,869
39	14	$ 25,262	$ 67,157	-$ 41,895
40	15	$ 30,024	$ 74,831	-$ 44,807
41	16	$ 39,717	$ 83,027	-$ 43,310
42	17	$ 52,183	$ 91,773	-$ 39,590
43	18	$ 67,890	$ 101,018	-$ 33,128
44	19	$ 80,082	$ 111,076	-$ 30,993
45	20	$ 93,622	$ 121,673	-$ 28,051
46	21	$ 108,568	$ 132,839	-$ 24,271
47	22	$ 124,969	$ 144,604	-$ 19,635
48	23	$ 143,325	$ 157,000	-$ 13,675
49	24	$ 161,971	$ 170,062	-$ 8,091
50	25	$ 182,764	$ 183,824	-$ 1,060
51	26	$ 205,947	$ 198,325	$ 7,622

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,655 (A) and her cumulative contributions are worth $17,039 (B). Her net pension wealth accrued at this point is -$13,384, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] National Center for Education Statistics, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[2] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[3] A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[4] In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[5] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[6] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[7] Retirement age depends on years of service; see the "Technical Matters" section for more.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[13] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

BURLINGTON SCHOOL DISTRICT (VERMONT)

SUMMARY

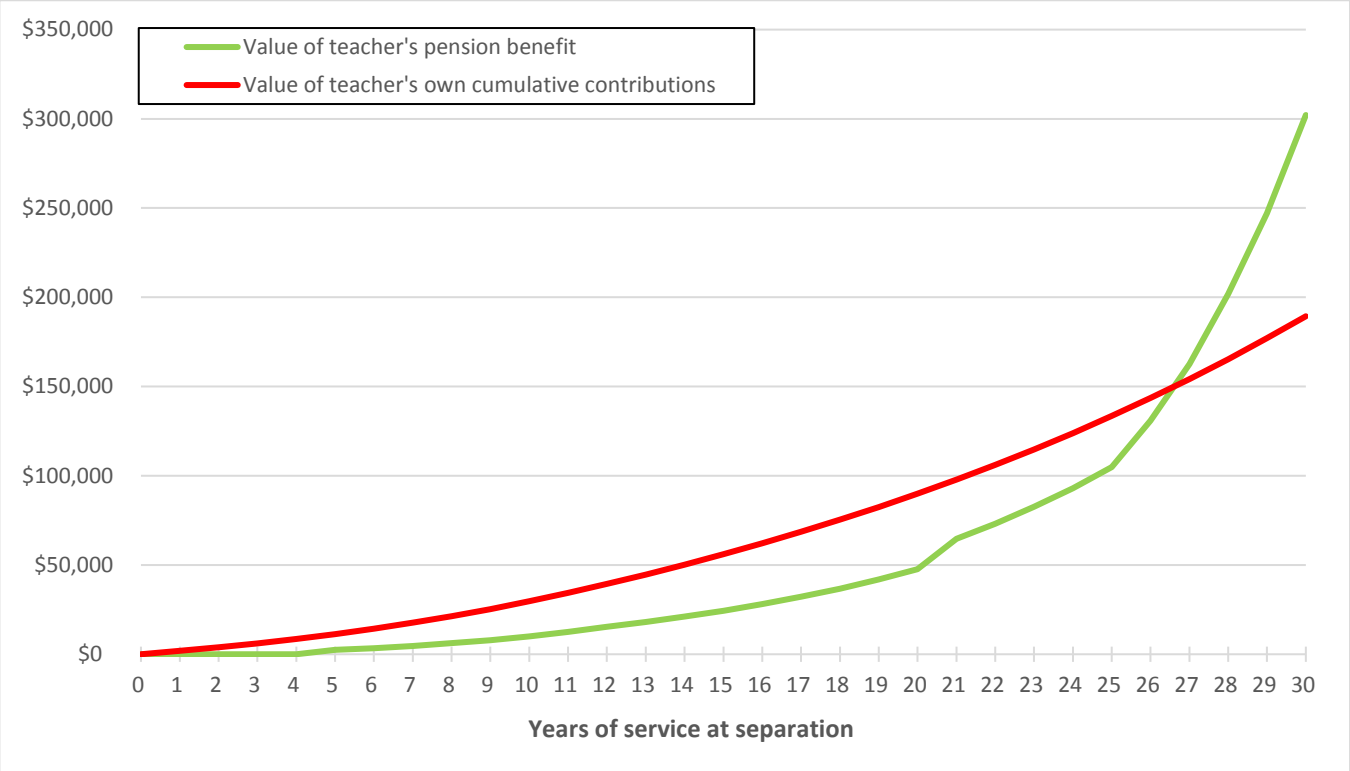
A new Burlington School District teacher enrolls in a traditional defined benefit plan under the Vermont State Teachers' Retirement System. In Burlington, the crossover point occurs after 27 years of service, meaning that until that point the value of what she would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is equal to the national median crossover point of the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	3,990
Teachers (FTE)	353

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	10,262
Total members	19,831

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in the Burlington School District must remain in the pension system for 27 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Burlington, a new teacher must stay 27 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Burlington teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $6,148 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 6,148	-$ 6,148
40	15	$ 24,367	$ 56,057	-$ 31,690
50	25	$ 104,800	$ 133,494	-$ 28,694
52	27	$ 162,667	$ 154,186	$ 8,481

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $24,367, but at this point she has contributed a total of $56,057. Not only has she not yet reached the crossover point, but her pension wealth is worth almost $32,000 less than her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Burlington teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is slightly smaller than it was mid-career. At this point, she's contributed $133,494 but would only expect to receive $104,800 in benefits.

AT THE CROSSOVER

After 27 years, a Burlington teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $154,186 into the system and can expect lifetime pension wealth accrual worth $162,667. Her net benefit becomes positive, though small ($8,481).

Bottom line: Vermont teachers who start at age 25 under the Burlington School District salary schedule must wait 27 years to reach the crossover point. Teachers who exit the Vermont retirement system early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 27 years.

TECHNICAL MATTERS

Retirement System

Teachers working the Burlington School District belong to a traditional defined benefit pension plan in the Vermont State Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and any/(Rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions

- Employee contribution rate: 6 percent of salary with less than five years of service; 5 percent with five years or more[10]
- Employer contribution rate: 12.79 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.67%) x (YOS up to 20) x (FAS) + (2.0%) x (YOS ≥ 20) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Burlington teacher qualifies for full pension benefits at age 65 with five years of service, or at any age as long as the sum of age and years of service is at least 90 (whichever comes first). The annual benefit is equal to the sum of (1) a teacher's years of service up to 20, multiplied by her average salary of her final three years, times an accrual factor of 1.67 percent, plus (2) a teacher's years of service equal to 20 or more, multiplied by her average salary of her final three years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[11] The plan does offer reduced pension benefits for early retirement, available at age 55 with five years of service.

The employer contribution rate is set at 12.79 percent of earnings. The employee contribution rate is set at 6 percent of earnings for teachers with less than five years of service, and 5 percent of earnings for teachers with five or more years.

Burlington teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[12]
- Survival probabilities from *2007 CDC Life Tables*[13]
- Teacher salary schedule for 2012–13 school year[14]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[15] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[16]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Burlington School District

Age	Years of service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,890	-$ 1,890
27	2	$ 0	$ 3,952	-$ 3,952
28	3	$ 0	$ 6,148	-$ 6,148
29	4	$ 0	$ 8,579	-$ 8,579
30	5	$ 2,469	$ 11,211	-$ 8,742
31	6	$ 3,452	$ 14,284	-$ 10,832
32	7	$ 4,681	$ 17,662	-$ 12,981
33	8	$ 6,194	$ 21,307	-$ 15,112
34	9	$ 7,832	$ 25,232	-$ 17,400
35	10	$ 9,929	$ 29,643	-$ 19,714
36	11	$ 12,471	$ 34,412	-$ 21,941
37	12	$ 15,324	$ 39,425	-$ 24,101
38	13	$ 18,146	$ 44,694	-$ 26,548
39	14	$ 21,081	$ 50,234	-$ 29,153
40	15	$ 24,367	$ 56,057	-$ 31,690
41	16	$ 28,044	$ 62,179	-$ 34,134
42	17	$ 32,154	$ 68,614	-$ 36,460
43	18	$ 36,745	$ 75,379	-$ 38,634
44	19	$ 41,868	$ 82,490	-$ 40,622
45	20	$ 47,582	$ 89,966	-$ 42,383
46	21	$ 64,612	$ 97,824	-$ 33,212
47	22	$ 73,108	$ 106,085	-$ 32,977
48	23	$ 82,567	$ 114,769	-$ 32,202
49	24	$ 93,092	$ 123,898	-$ 30,806
50	25	$ 104,800	$ 133,494	-$ 28,694
51	26	$ 130,765	$ 143,582	-$ 12,817
52	27	$ 162,667	$ 154,186	$ 8,481
53	28	$ 201,787	$ 165,334	$ 36,453
54	29	$ 247,098	$ 177,053	$ 70,045
55	30	$ 302,128	$ 189,372	$ 112,757

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $2,469 (A) and her cumulative contributions are worth $11,211 (B). Her net pension wealth accrued at this point is -$8,742, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 The employee contribution rate has since increased under Act 114 (2016), which was passed after our calculations were complete. The increased contribution rate would push the crossover point even later..able X o reach the cross-m $0 in h ut if so it would be: to make sure that doesn'arriage equality). Maybe gays in the military?

11 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

12 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a Bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

13 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

14 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

15 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

16 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

KANAWHA COUNTY SCHOOLS (WEST VIRGINIA)

SUMMARY

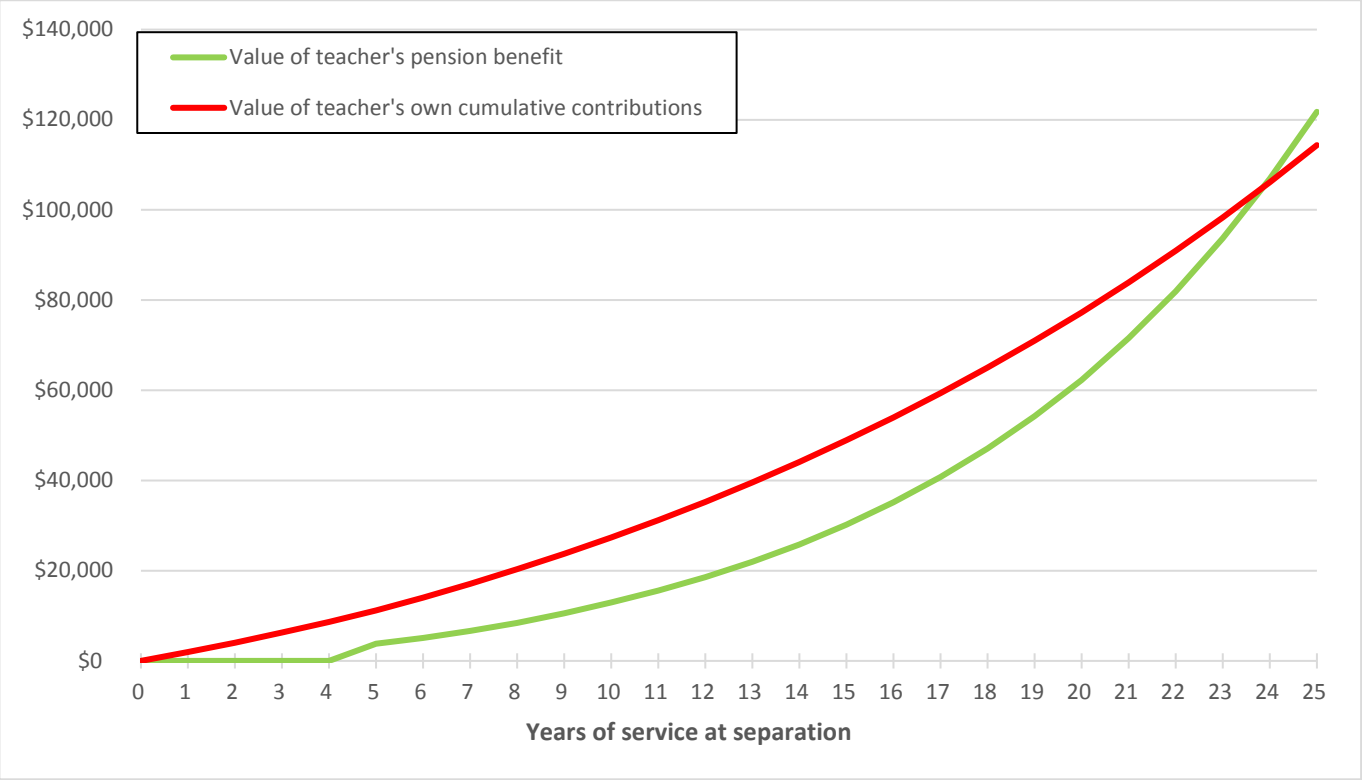
Kanawha County Schools teachers enroll in a traditional defined benefit plan under the West Virginia Consolidated Public Retirement Board's State Teachers' Retirement System. In Kanawha County, the crossover point occurs after 24 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. While this is slightly shorter than the national median crossover point of 27 years for the defined benefit plans in this study, it is longer than the career of the majority of American teachers.[1]

About the District	
Students	28,378
Teachers (FTE)	1,926

About the Retirement Plan	
Type	Defined benefit
Coverage	Teachers
Active members	35,855
Total members	70,146

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of July, 2011)

Figure 1: A new teacher in Kanawha County must remain in the pension system for 24 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Kanawha County, a new teacher must stay 24 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Kanawha County teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $6,268 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is her pension wealth? How much has she contributed? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 6,268	-$ 6,268
40	15	$ 30,189	$ 48,929	-$ 18,740
49	24	$ 106,905	$ 106,156	$ 749
50	25	$ 121,757	$ 114,368	$ 7,389

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative--and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $30,189, but at this point she has contributed a total of $48,929. Not only has she not yet reached the crossover point, but her pension wealth is worth $18,740 less than her cumulative contributions.

AT THE CROSSOVER

After 24 years, a Kanawha County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $106,156 into the system and can expect lifetime pension wealth accrual worth $106,905. Her net benefit becomes positive, though small ($749).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Kanawha County teacher's net benefit that is larger than it was the year before, but still small ($7,389).

Bottom line: West Virginia teachers who start at age 25 under the Kanawha County Schools salary schedule must wait 24 years to reach the crossover point. Teachers who exit the West Virginia retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 24 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Kanawha County Schools belong to a traditional defined benefit pension plan in West Virginia Consolidated Public Retirement Board's State Teachers' Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 55/30, 60/5, and any/35
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 60/10, 57/20, and 55/30

Employer and employee contributions

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: 23.13 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Kanawha County teacher qualifies for full pension benefits at age 55 with 30 years of service, age 60 with five years of service, or at any age with 35 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after five years—meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 60 with 10 years of service, age 57 with 20 years of service, or age 55 with 30 years of service, whichever comes first.

The employer contribution rate is set at 23.13 percent of earnings. The employee contribution rate is set at 6 percent of earnings. Kanawha County teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Kanawha County Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,955	-$ 1,955
27	2	$ 0	$ 4,043	-$ 4,043
28	3	$ 0	$ 6,268	-$ 6,268
29	4	$ 0	$ 8,638	-$ 8,638
30	5	$ 3,812	$ 11,175	-$ 7,363
31	6	$ 5,104	$ 14,044	-$ 8,940
32	7	$ 6,632	$ 17,090	-$ 10,458
33	8	$ 8,429	$ 20,320	-$ 11,892
34	9	$ 10,530	$ 23,745	-$ 13,215
35	10	$ 12,962	$ 27,373	-$ 14,411
36	11	$ 15,573	$ 31,214	-$ 15,641
37	12	$ 18,554	$ 35,279	-$ 16,725
38	13	$ 21,948	$ 39,579	-$ 17,631
39	14	$ 25,807	$ 44,124	-$ 18,317
40	15	$ 30,189	$ 48,929	-$ 18,740
41	16	$ 35,155	$ 54,005	-$ 18,849
42	17	$ 40,770	$ 59,362	-$ 18,593
43	18	$ 47,109	$ 65,016	-$ 17,907
44	19	$ 54,256	$ 70,979	-$ 16,724
45	20	$ 62,303	$ 77,268	-$ 14,965
46	21	$ 71,545	$ 83,933	-$ 12,388
47	22	$ 81,964	$ 90,958	-$ 8,994
48	23	$ 93,699	$ 98,359	-$ 4,661
49	24	$ 106,905	$ 106,156	$ 749
50	25	$ 121,757	$ 114,368	$ 7,389

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,812 (A) and her cumulative contributions are worth $11,175 (B). Her net pension wealth accrued at this point is -$7,363, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

MILWAUKEE PUBLIC SCHOOLS (WISCONSIN)

SUMMARY

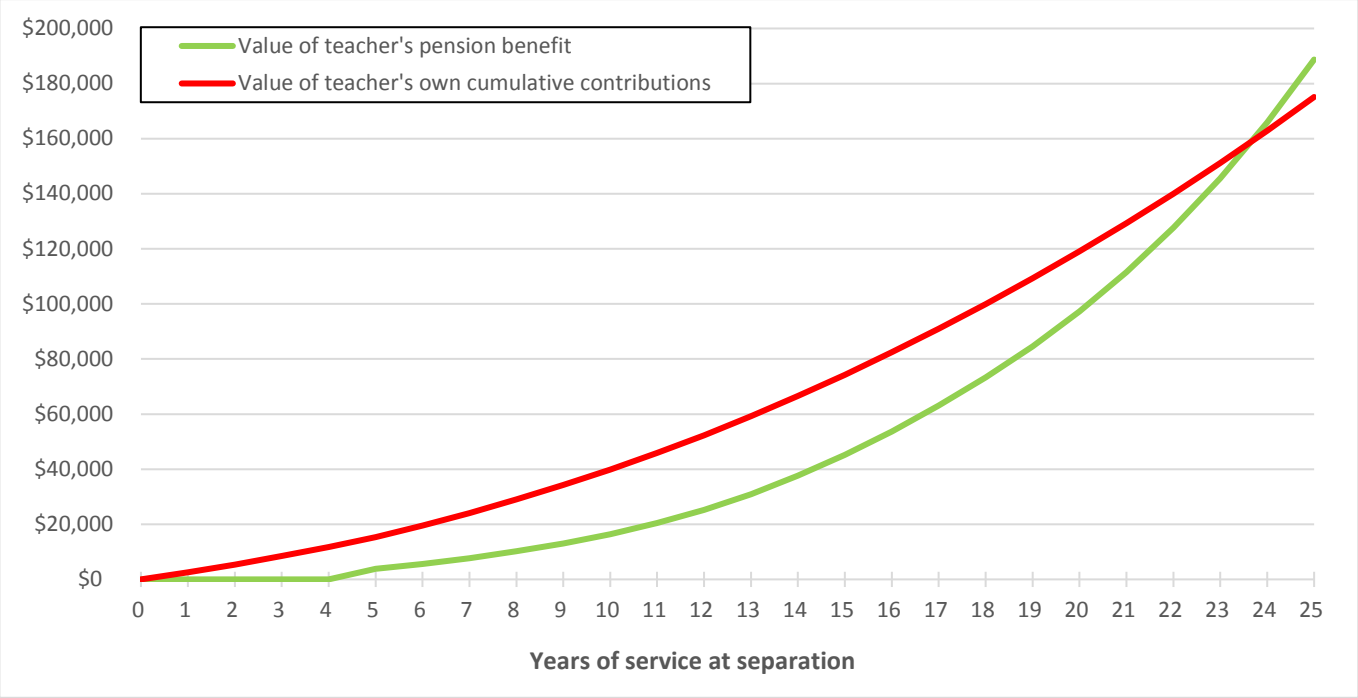
Milwaukee Public Schools teachers enroll in a traditional defined benefit plan under the Wisconsin Retirement System. In Milwaukee, the crossover point occurs after 24 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. While this is slightly shorter than the national median crossover point of 27 years for the defined benefit plans in this study, it is longer than the career of the majority of American teachers.[1]

About the District	
Students	78,516
Teachers (FTE)	4,082

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	257,255
Total members	603,983

Sources: Enrollment: NCES (2013–14). Retirement plan membership: 2014 Comprehensive Annual Financial Report for the State of Wisconsin Department of Employee Trust Funds (membership as of December, 2014; includes all employees)

Figure 1: A new teacher in Milwaukee Public Schools must remain in the pension system for 24 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's lifetime pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Milwaukee, a new teacher must stay 24 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Milwaukee teacher who leaves after **three years** of service (or at any point before the vesting point of five years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $8,436 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 8,436	-$ 8,436
40	15	$ 45,177	$ 74,272	-$ 29,095
49	24	$ 165,890	$ 162,886	$ 3,005
50	25	$ 188,721	$ 175,124	$ 13,598

MID-CAREER

If she leaves the system with at least **five years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $45,177, but at this point she has contributed a total of $74,272. Not only has she not yet reached the crossover point, but her pension wealth is worth almost $30,000 less than her cumulative contributions.

AT THE CROSSOVER

After 24 years, a Milwaukee teacher finally reaches the crossover point—meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $162,886 into the system and can expect lifetime pension wealth accrual worth $165,890. Her net benefit becomes positive, though small ($3,005).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] After 25 years, a Milwaukee teacher's net benefit is larger than it was the year before, but still small ($13,598).

Bottom line: Wisconsin teachers who start at age 25 under the Milwaukee Public Schools salary schedule must wait 24 years to reach the crossover point. Teachers who exit the Wisconsin retirement system early are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 24 years.

TECHNICAL MATTERS

Retirement System

Teachers working in Milwaukee Public Schools belong to a traditional defined benefit pension plan in the Wisconsin Retirement System.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and 57/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/any

Employer and employee contributions

- Employee contribution rate: 6.6 percent of salary
- Employer contribution rate: 6.6 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (1.6%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Milwaukee teacher qualifies for full pension benefits at age 65 with five years of service or age 57 with 30 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 1.6 percent. A teacher vests into the pension system after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with any years of service.

The employer contribution rate is set at 6.6 percent of earnings. The employee contribution rate is set at 6.6 percent of earnings.

Milwaukee teachers do pay into Social Security.

Assumptions for Computing Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Milwaukee Public Schools

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,576	-$ 2,576
27	2	$ 0	$ 5,385	-$ 5,385
28	3	$ 0	$ 8,436	-$ 8,436
29	4	$ 0	$ 11,742	-$ 11,742
30	5	$ 3,882	$ 15,313	-$ 11,431
31	6	$ 5,539	$ 19,549	-$ 14,010
32	7	$ 7,638	$ 24,108	-$ 16,470
33	8	$ 10,247	$ 29,005	-$ 18,758
34	9	$ 13,070	$ 34,256	-$ 21,186
35	10	$ 16,441	$ 39,876	-$ 23,436
36	11	$ 20,445	$ 45,884	-$ 25,439
37	12	$ 25,237	$ 52,323	-$ 27,086
38	13	$ 30,950	$ 59,230	-$ 28,280
39	14	$ 37,605	$ 66,540	-$ 28,935
40	15	$ 45,177	$ 74,272	-$ 29,095
41	16	$ 53,674	$ 82,447	-$ 28,772
42	17	$ 63,092	$ 90,996	-$ 27,904
43	18	$ 73,335	$ 99,938	-$ 26,603
44	19	$ 84,574	$ 109,289	-$ 24,715
45	20	$ 97,255	$ 119,070	-$ 21,814
46	21	$ 111,548	$ 129,298	-$ 17,751
47	22	$ 127,640	$ 139,996	-$ 12,356
48	23	$ 145,564	$ 151,185	-$ 5,620
49	24	$ 165,890	$ 162,886	$ 3,005
50	25	$ 188,721	$ 175,124	$ 13,598

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $3,882 (A) and her cumulative contributions are worth $15,313 (B). Her net pension wealth accrued at this point is -$11,431, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

LARAMIE COUNTY SCHOOL DISTRICT (WYOMING)

SUMMARY

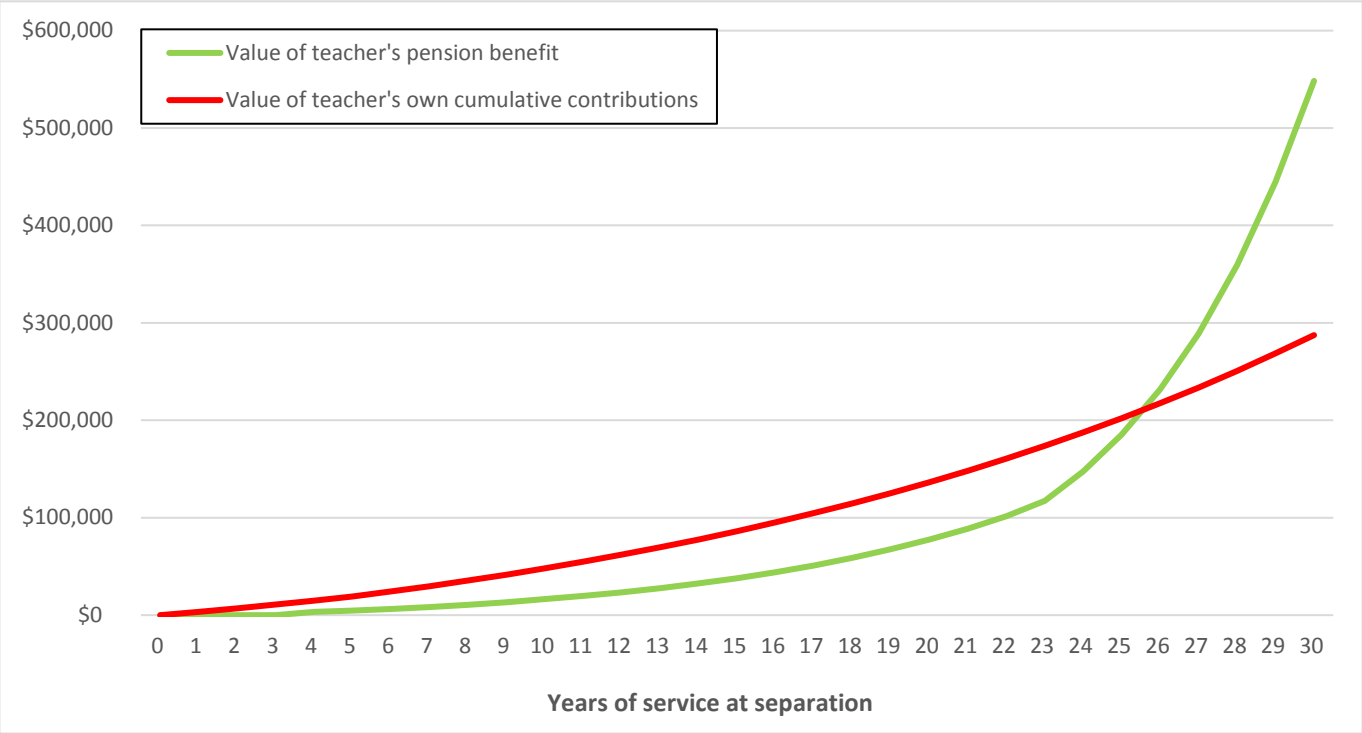
Laramie County School District teachers enroll in a traditional defined benefit plan under the Wyoming Retirement System's Public Employee Pension Plan. In Laramie County, the crossover point occurs after 26 years of service, meaning that until that point the value of what a teacher would receive in pension wealth after she retires is *less* than the value of her cumulative contributions. This is just one year shorter than the national median crossover point of 27 years for the defined benefit plans in this study, and it is longer than the career of the majority of American teachers.[1]

About the District	
Students	13,635
Teachers (FTE)	1,046

About the Retirement Plan	
Type	Defined benefit
Coverage	Public employees
Active members	36,070
Total members	80,855

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of January, 2012; includes all members)

Figure 1: A new teacher in the Laramie County School District must remain in the pension system for 26 years before she realizes a return on her contributions



Note: Calculations assume inflation of 2.5 percent, a real interest rate of 2.5 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The green line is the value of a teacher's pension wealth should she separate from the system after a given number of years of service. (She would not start receiving pension payments until she reaches the age of retirement eligibility, even if she leaves the system before that.) Where the green line jumps quickly away from $0 represents the time at which she vests. The red line shows the value of the total amount she has contributed to the system up to that point. Where the red line lies above the green, the teacher's contributions are worth more than her benefits. In other words, her "net benefit" is negative. Where the green line is higher than the red, her benefits are worth more than her contributions and her net benefit is positive. In Laramie County, a new teacher must stay 26 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement. Exact figures are shown in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[2] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[3] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[4] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[5] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Laramie County teacher who leaves after **three years** of service (or at any point before the vesting point of four years) is not eligible to receive pension benefits at all, because she has not vested (Table 1). Her pension wealth is zero, and after three years she has contributed $10,779 into the retirement system.[6] (In reality, should this teacher separate from the system before she vests, she can only take a refund, which may or may not be credited with interest.)

Table 1. At key points in a teacher's career, what is the value of her pension? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 10,779	-$ 10,779
40	15	$ 37,968	$ 86,243	-$ 48,275
50	25	$ 185,256	$ 202,147	-$ 16,891
51	26	$ 231,780	$ 217,508	$ 14,271

MID-CAREER

If she leaves the system with at least **four years** of service, she has now vested and is eligible to start receiving pension benefits once she reaches retirement age.[7] But her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] Her pension wealth is $37,968, but at this point she has contributed a total of $86,243. Not only has she not yet reached the crossover point, but her pension wealth is worth less than half of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] But even after 25 years, a Laramie County teacher still has not reached the crossover point, although the difference between her contributions and pension wealth is smaller than it was mid-career. At this point, she's contributed $202,147 but would only expect to receive $185,256 in benefits.

AT THE CROSSOVER

After 26 years, a Laramie County teacher finally reaches the crossover point, meaning her benefits are worth more than her contributions. At that point, she will have contributed a total of $217,508 into the system and can expect lifetime pension wealth accrual worth $231,780. Her net benefit becomes positive, and though modest ($14,271).

Bottom line: Wyoming teachers who start at age 25 under the Laramie County School District salary schedule must wait 26 years to reach the crossover point. Teachers who exit the Wyoming retirement system early, or even after a relatively lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same system much longer—in this case, at least 26 years.

TECHNICAL MATTERS

Retirement System

Teachers working in the Laramie County School District belong to a traditional defined benefit pension plan in the Wyoming Retirement System's Public Employee Pension Plan.

Plan Provisions by the Numbers

Eligibility for pension benefits

- Vesting requirement: Four years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/4 and Rule of 85
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 55/4 and any/25

Employer and employee contributions

- Employee contribution rate: 8.25 percent of salary
- Employer contribution rate: 8.37 percent of salary
- Refundable contributions: employee contributions plus interest

Defined benefit formula

A new teacher's normal retirement benefit is equal to the formula below:

Annual benefit = (2.0%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Summary of Plan Provisions

Benefits under public pension plans are typically based on a combination of age and years of service. Under normal retirement eligibility requirements, a Laramie County teacher qualifies for full pension benefits at age 65 with four years of service, or at any age as long as the sum of her age and years of service is at least 85 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by the average salary of her final five years, times an accrual factor of 2.0 percent. A teacher vests into the pension system after four years—meaning after four years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[10] The plan does offer reduced pension benefits for early retirement, available at age 55 with four years of service or at any age with 25 years of service, whichever comes first.

The employer contribution rate is set at 8.37 percent of earnings. The employee contribution rate is set at 8.25 percent of earnings. Laramie County teachers do pay into Social Security.

Assumptions for Compensating Pension Wealth

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Survival probabilities from *2007 CDC Life Tables*[12]
- Teacher salary schedule for 2012–13 school year[13]
- Overall rate of return: we use each system's own assumptions for return on investments

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Laramie County School District

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 3,378	-$ 3,378
27	2	$ 0	$ 6,967	-$ 6,967
28	3	$ 0	$ 10,779	-$ 10,779
29	4	$ 3,452	$ 14,825	-$ 11,372
30	5	$ 4,624	$ 19,117	-$ 14,493
31	6	$ 6,265	$ 24,262	-$ 17,996
32	7	$ 8,231	$ 29,709	-$ 21,478
33	8	$ 10,566	$ 35,474	-$ 24,908
34	9	$ 13,321	$ 41,574	-$ 28,253
35	10	$ 16,554	$ 48,025	-$ 31,471
36	11	$ 19,820	$ 54,847	-$ 35,027
37	12	$ 23,537	$ 62,059	-$ 38,523
38	13	$ 27,758	$ 69,682	-$ 41,924
39	14	$ 32,545	$ 77,736	-$ 45,191
40	15	$ 37,968	$ 86,243	-$ 48,275
41	16	$ 44,102	$ 95,229	-$ 51,126
42	17	$ 51,035	$ 104,717	-$ 53,683
43	18	$ 58,861	$ 114,735	-$ 55,874
44	19	$ 67,689	$ 125,308	-$ 57,619
45	20	$ 77,638	$ 136,465	-$ 58,827
46	21	$ 88,844	$ 148,238	-$ 59,394
47	22	$ 101,456	$ 160,659	-$ 59,203
48	23	$ 117,331	$ 173,760	-$ 56,429
49	24	$ 147,658	$ 187,577	-$ 39,920
50	25	$ 185,256	$ 202,147	-$ 16,891
51	26	$ 231,780	$ 217,508	$ 14,271
52	27	$ 289,244	$ 233,704	$ 55,540
53	28	$ 359,403	$ 250,728	$ 108,675
54	29	$ 444,780	$ 268,625	$ 176,155
55	30	$ 548,358	$ 287,438	$ 260,920

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $4,624 (A) and her cumulative contributions are worth $19,117 (B). Her net pension wealth accrued at this point is -$14,493, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 National Center for Education Statistics, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

2 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

3 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

4 In technical terms, pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

5 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

6 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

7 Retirement age depends on years of service; see the "Technical Matters" section for more.

8 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

9 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

10 A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

11 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

12 E. Arias, "United States Life Tables, 2007," National Vital Statistics Reports 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

13 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

14 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

15 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

ANCHORAGE SCHOOL DISTRICT (ALASKA)

SUMMARY

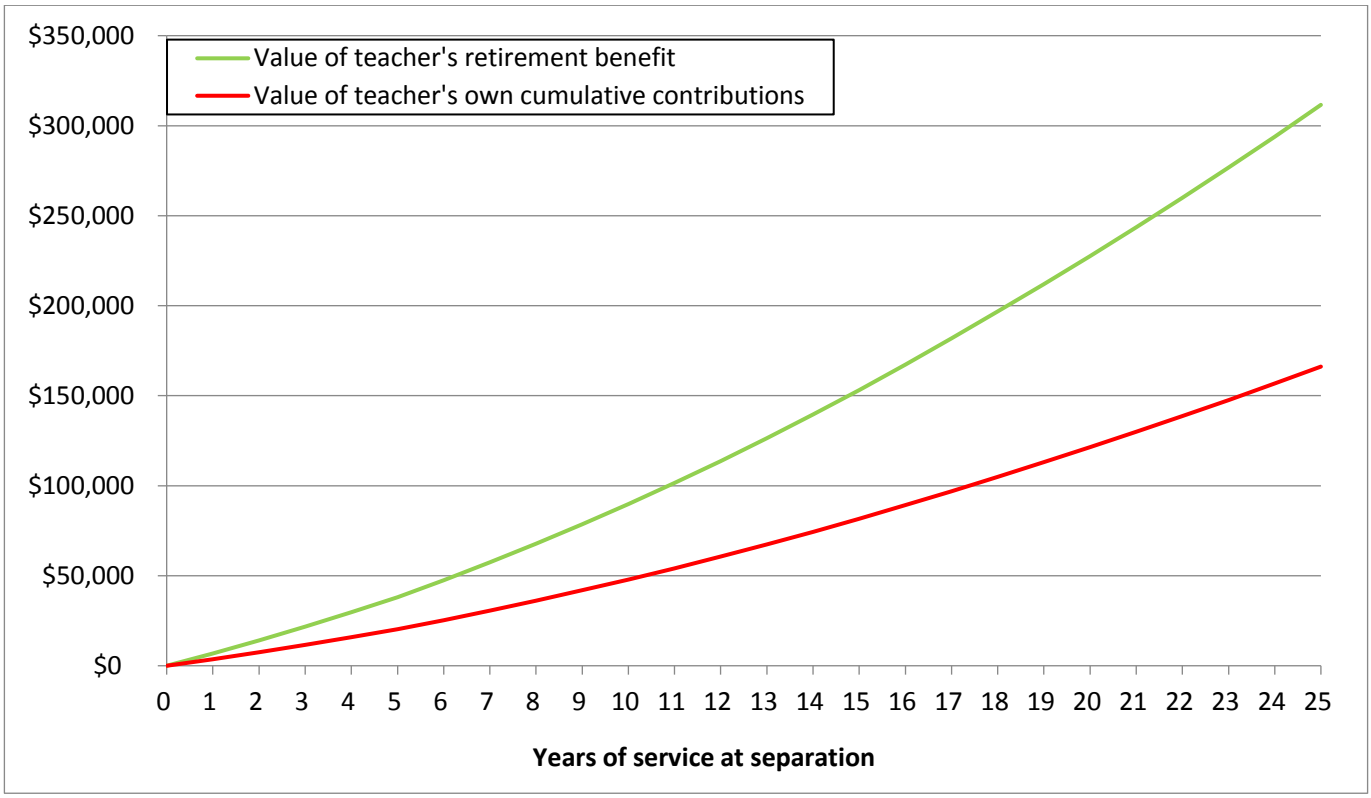
Anchorage teachers enroll in a defined contribution plan under the Alaska Teachers' Retirement System. There is no crossover point because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere.

About the District	
Students	48,159
Teachers (FTE)	2,902

About the Retirement Plan	
Type	Defined contribution
Coverage	Teachers
Active members	7,303
Total members	19,171

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June. 2011)

Figure 1: A new teacher in the Anchorage School District realizes a return on her contributions immediately, and her net benefit grows over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For an Anchorage teacher, there is no crossover point—her retirement benefit (green line) is always worth more than her cumulative contributions (red line), and her "net benefit" (the difference between the two) is always positive. She does not have to work a specified number of years in order to receive the balance of her retirement account in which she is vested, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[3] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[4] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[5] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[6] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Anchorage teacher is always eligible to receive her contributions plus investment earnings on those contributions. After five years, she is also vested into the entire employer contribution, meaning after five years her benefit also includes the employer contribution plus investment earnings. (She partially vests into the employer contributions starting at two years of service.) After five years, the value of her contributions is $20,270 and the balance of her retirement account is $38,007—just shy of double her cumulative contributions. Her net benefit (benefit minus contributions) is $17,736.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
30	5	$ 38,007	$ 20,270	$ 17,736
40	15	$ 153,155	$ 81,683	$ 71,472
50	25	$ 311,570	$ 166,171	$ 145,399

MID-CAREER

Although there is no financial penalty for leaving the system early—an Anchorage teacher's net benefit is always positive—her net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] At this point she has contributed a total of $81,683, and her retirement benefit is worth $153,155.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] Should an Anchorage teacher stay 25 years, the balance of her retirement account has had even more time to grow. Her contributions are worth $166,171 and the value of her retirement account is now $311,570, with a net benefit of $145,399.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. An Anchorage teacher can separate from the system at any point and her retirement benefit will be worth more than her contributions. She can always leave without financial penalty, and once vested she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for Alaska teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

TECHNICAL MATTERS

Retirement System

A teacher working in the Anchorage School District enrolls in the Alaska Teachers' Retirement System, a defined contribution plan in which a teacher's retirement benefit is equal to her account balance when she separates from the system.

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Teachers immediately vest in their own contributions plus investment earnings. Teachers vest in employer contributions plus investment earnings on the following schedule: 25 percent after two years of service, 50 percent after three years, 75 percent after four years, and 100 percent after five years.
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account in which they have vested at any time.

Employer and employee contributions

- Employee contribution rate: 8 percent of salary
- Employer contribution rate: 7 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, an Anchorage teacher receives the balance of her personal retirement account: her own contributions plus investment earnings, and all of the employer contributions plus investment earnings in which she is vested. After entering service, a teacher immediately vests in (or is eligible to receive) her own contributions. She fully vests in the employer contribution after five years, and partially vests before that. There are no age or years of service requirements for retirement.

The employer contribution rate is set at 7 percent of earnings. The employee contribution rate is set at 8 percent of earnings.

Anchorage teachers do not pay into Social Security.

Assumptions for Computing Retirement Benefits

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[9]
- Teacher salary schedule for 2012–13 school year[10]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[11] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[12]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Anchorage School District

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 6,875	$ 3,667	$ 3,208
27	2	$ 14,104	$ 7,522	$ 6,582
28	3	$ 21,697	$ 11,572	$ 10,125
29	4	$ 29,661	$ 15,819	$ 13,842
30	5	$ 38,007	$ 20,270	$ 17,736
31	6	$ 47,510	$ 25,339	$ 22,171
32	7	$ 57,432	$ 30,630	$ 26,802
33	8	$ 67,783	$ 36,151	$ 31,632
34	9	$ 78,573	$ 41,906	$ 36,667
35	10	$ 89,813	$ 47,900	$ 41,913
36	11	$ 101,514	$ 54,141	$ 47,373
37	12	$ 113,687	$ 60,633	$ 53,054
38	13	$ 126,343	$ 67,383	$ 58,960
39	14	$ 139,495	$ 74,398	$ 65,098
40	15	$ 153,155	$ 81,683	$ 71,472
41	16	$ 167,334	$ 89,245	$ 78,089
42	17	$ 181,860	$ 96,992	$ 84,868
43	18	$ 196,739	$ 104,928	$ 91,812
44	19	$ 211,982	$ 113,057	$ 98,925
45	20	$ 227,597	$ 121,385	$ 106,212
46	21	$ 243,592	$ 129,916	$ 113,676
47	22	$ 259,977	$ 138,654	$ 121,323
48	23	$ 276,762	$ 147,606	$ 129,156
49	24	$ 293,956	$ 156,777	$ 137,180
50	25	$ 311,570	$ 166,171	$ 145,399

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $38,007 (A) and her cumulative contributions are worth $20,270 (B). Her net pension wealth accrued at this point is $17,736, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

2 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

3 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

4 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

5 Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

6 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

10 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

11 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

12 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

MIAMI-DADE COUNTY PUBLIC SCHOOLS (FLORIDA)

SUMMARY

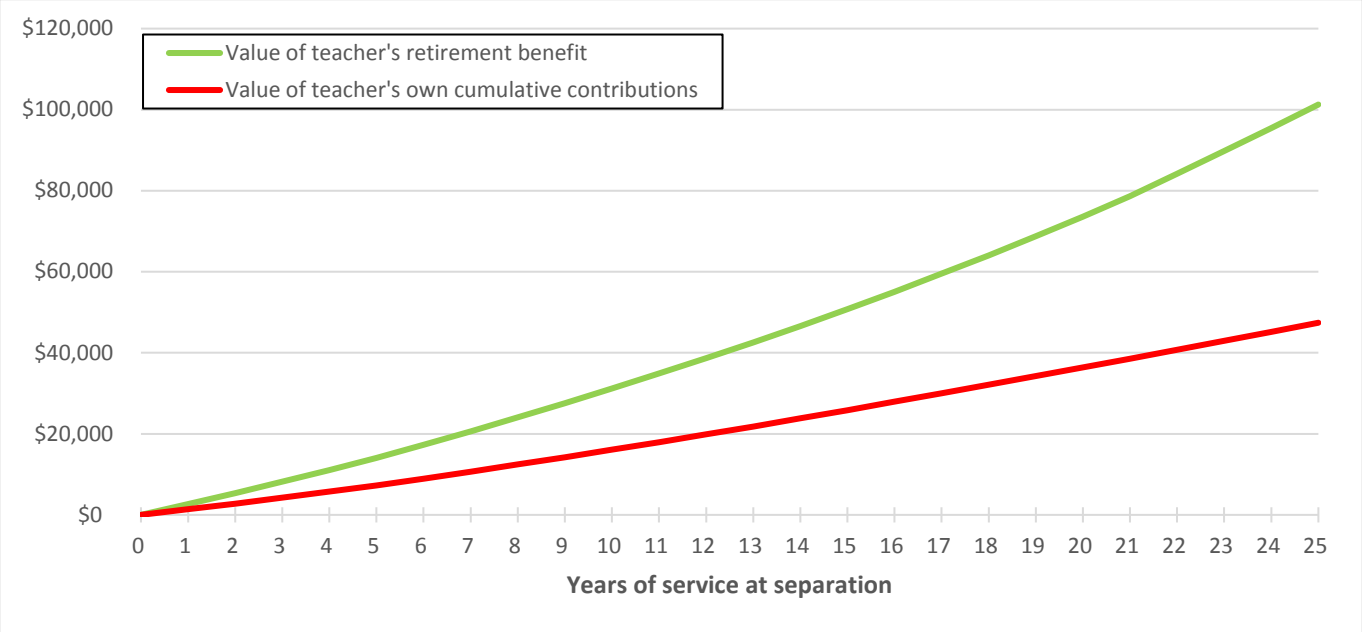
Miami-Dade County Public Schools teachers can enroll in the Florida Retirement System (FRS) Investment Plan, a defined contribution plan. There is no crossover point for this plan because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere. (Miami-Dade teachers may choose the FRS Pension Plan, a traditional defined benefit plan, rather than the FRS Investment Plan. There is also a Hybrid Option for the Investment Plan.)

About the District	
Students	356,233
Teachers (FTE)	20,527

About the Retirement Plan	
Type	Defined contribution
Coverage	Public employees
Active members	622,089
Total members	985,123

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Florida Retirement System Pension Plan and Other State Administered Systems Comprehensive Annual Financial Report (membership as of June, 2014; includes members of all FRS plans)

Figure 1: A new teacher in Miami-Dade County who chooses the DC plan realizes a return on her contributions immediately, and her net benefit grows over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For a Miami-Dade County teacher who selects the defined contribution plan, there is no crossover point—her retirement benefit (green line) is always worth more than her cumulative contributions (red line), and her "net benefit" (the difference between the two) is always positive. She does not have to work a specified number of years in order to receive the balance of her retirement account, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[3] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[4] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[5] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[6] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Miami-Dade County teacher who selects the DC plan is always eligible to receive her contributions plus investment earnings on those contributions. She must stay **one year** until she is vested into the entire employer contribution, meaning after one year her benefit also includes the employer contribution plus investment earnings. Say she leaves after three years. At this point, the value of her contributions is $4,234 and the balance of her retirement account is $8,193. Her net benefit (benefit minus contributions) is $3,958.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 8,193	$ 4,234	$ 3,958
40	15	$ 50,763	$ 25,843	$ 24,919
50	25	$ 101,261	$ 47,411	$ 53,850

MID-CAREER

Although there is no financial penalty for leaving the system early—under the DC plan, a Miami-Dade County teacher's net benefit is always positive—the net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] At this point she has contributed a total of $25,843 to the account, and her retirement benefit is worth $50,763; her benefits are worth about double her cumulative contributions. However, a Miami-Dade County teacher's net benefit at this point is small relative to teachers in some other states enrolled in DC plans, and remains so later on through her career, because the employee and employer contribution rates are comparatively low.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] Should a Miami-Dade County teacher who selects the DC plan stay 25 years, the balance of her retirement account has had more time to grow. Her contributions are worth $47,411, and the value of her retirement account is now $101,261.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. A Miami-Dade County teacher who opts for the state's defined contribution plan can separate from the system at any point and her retirement benefit will be worth more than her contributions. She can always leave without financial penalty, and she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for Florida teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

Retirement System

A teacher working in Miami-Dade County can opt for the Florida Retirement System (FRS) Investment Plan, a defined contribution plan in which a teacher's retirement benefit is equal to her account balance when she separates from the system. Miami-Dade teachers may choose the FRS Pension Plan, a traditional defined benefit plan, rather than the FRS Investment Plan. There is also a Hybrid Option for the Investment Plan.

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Teachers immediately vest in their own contributions plus investment earnings, and vest in employer contributions plus investment earnings after one year.
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions

- Employee contribution rate: 3 percent of salary
- Employer contribution rate: 3.3 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, a Miami-Dade County teacher receives the balance of her personal retirement account: her own contributions plus investment earnings, and all of the employer contributions plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher vests in (or is eligible to receive) her own contributions immediately, and those of her employer after one year of service.

The employer contribution rate is set at 3 percent of earnings. The employee contribution rate is set at 3.3 percent of earnings.

Miami-Dade teachers do pay into Social Security.

Assumptions for Computing Retirement Benefit

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[9]
- Teacher salary schedule for 2012–13 school year[10]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[11] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[12]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Miami-Dade County Public Schools

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 2,663	$ 1,375	$ 1,288
27	2	$ 5,393	$ 2,786	$ 2,607
28	3	$ 8,193	$ 4,234	$ 3,958
29	4	$ 11,061	$ 5,718	$ 5,343
30	5	$ 14,009	$ 7,239	$ 6,771
31	6	$ 17,274	$ 8,931	$ 8,343
32	7	$ 20,624	$ 10,661	$ 9,963
33	8	$ 24,059	$ 12,427	$ 11,633
34	9	$ 27,582	$ 14,229	$ 13,353
35	10	$ 31,195	$ 16,070	$ 15,125
36	11	$ 34,898	$ 17,947	$ 16,951
37	12	$ 38,695	$ 19,863	$ 18,831
38	13	$ 42,585	$ 21,818	$ 20,768
39	14	$ 46,562	$ 23,811	$ 22,752
40	15	$ 50,763	$ 25,843	$ 24,919
41	16	$ 55,056	$ 27,916	$ 27,140
42	17	$ 59,525	$ 30,004	$ 29,521
43	18	$ 64,069	$ 32,108	$ 31,961
44	19	$ 68,780	$ 34,231	$ 34,550
45	20	$ 73,614	$ 36,372	$ 37,242
46	21	$ 78,663	$ 38,534	$ 40,129
47	22	$ 84,154	$ 40,718	$ 43,436
48	23	$ 89,748	$ 42,924	$ 46,824
49	24	$ 95,449	$ 45,155	$ 50,294
50	25	$ 101,261	$ 47,411	$ 53,850

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $14,009 (A) and her cumulative contributions are worth $7,239 (B). Her net pension wealth accrued at this point is $6,771, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

2 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

3 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

4 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

5 Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

6 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

10 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

11 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

12 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

DETROIT PUBLIC SCHOOLS COMMUNITY DISTRICT (MICHIGAN)

SUMMARY

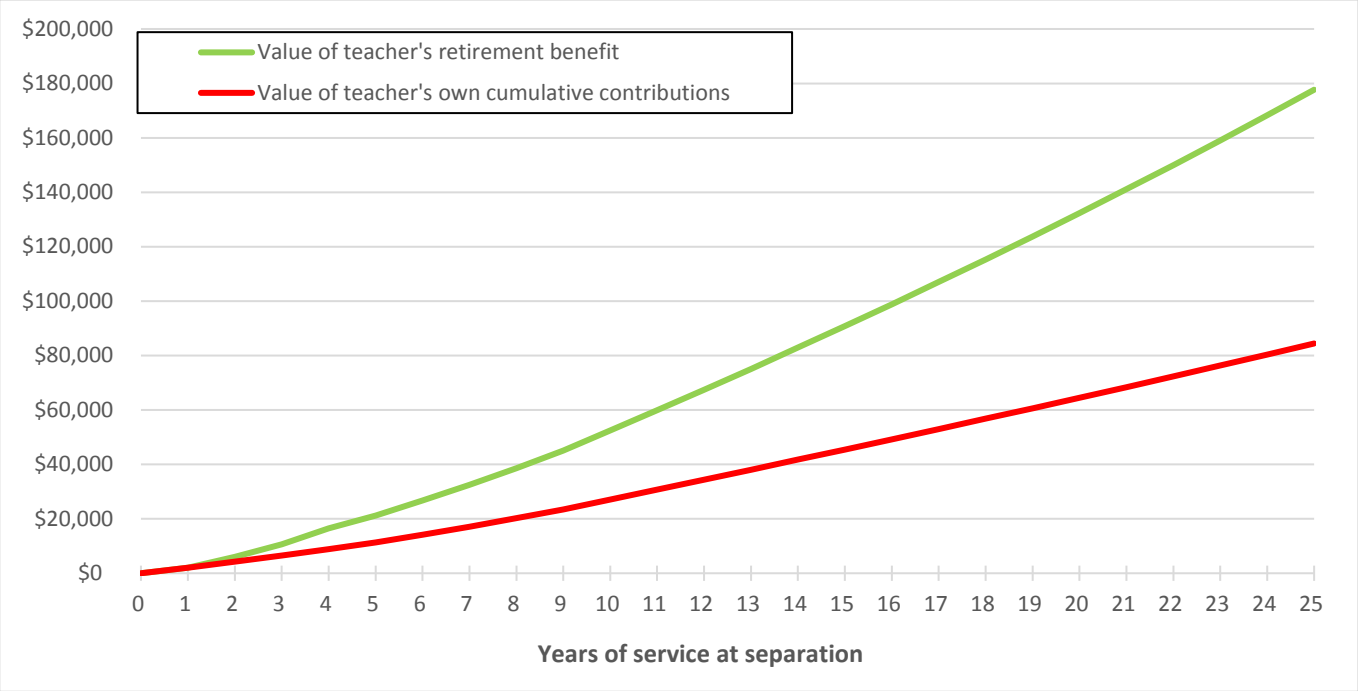
Detroit teachers can enroll in the Michigan Public Schools Employees' Retirement System's Defined Contribution Plan. There is no crossover point for this plan because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere. (Detroit teachers may choose a hybrid plan called the Pension Plus Plan rather than the Defined Contribution Plan.)

About the District	
Students	49,043
Teachers (FTE)	3,084

About the Retirement Plan	
Type	Defined contribution
Coverage	Teachers
Active members	106,671
Total members	436,070

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Michigan Public School Employees' Retirement System Comprehensive Annual Financial Report (membership as of September, 2015; includes members of both plan types)

Figure 1: A new teacher in the Detroit Public Schools Community District who chooses the DC plan realizes a return on her contributions immediately, and her net benefit grows over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For a Detroit teacher who selects the defined contribution plan, there is no crossover point—her retirement benefit (green line) is always worth more than her cumulative contributions (red line), and her "net benefit" (the difference between the two) is always positive. She does not have to work a specified number of years in order to receive the balance of her retirement account in which she is vested, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[3] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[4] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[5] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[6] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Detroit teacher who selects the DC plan is always eligible to receive her contributions plus investment earnings on those contributions. After **four years** she is also vested into the entire employer contribution, meaning after four years her benefit also includes the employer contribution plus investment earnings. (She partially vests into the employer contributions starting at two years of service.) After four years, the value of her contributions is $8,828 and the balance of her retirement account is $16,464. The net benefit (benefit minus contributions) is $7,636.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
29	4	$ 16,464	$ 8,828	$ 7,636
40	15	$ 90,803	$ 45,472	$ 45,331
50	25	$ 177,680	$ 84,429	$ 93,251

MID-CAREER

Although there is no financial penalty for leaving the system early—under the DC plan, a Detroit teacher's net benefit is always positive—her net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] At this point she has contributed a total of $45,472 to the account, and her retirement benefit is worth $90,803—double the value of her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] Should a Detroit teacher who selects the DC plan stay 25 years, the balance of her retirement account has had even more time to grow. Her contributions are worth $84,429, and the value of her retirement account is now $177,680.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. A Detroit teacher who opts for the state's defined contribution plan can separate from the system at any point and her retirement benefit will be worth more than her contributions. She can always leave without financial penalty, and once vested she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for Michigan teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

TECHNICAL MATTERS

Retirement System

Teachers working in the Detroit Public Schools Community District can opt for the Michigan Public Schools Employees' Retirement System's Defined Contribution Plan, in which a teacher's retirement benefit is equal to her account balance when she separates from the system. Detroit teachers may instead enroll in a hybrid plan called the Pension Plus Plan.

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Teachers immediately vest in their own contributions plus investment earnings. Teachers vest in employer contributions plus investment earnings on the following schedule: 50 percent after two years of service, 75 percent after three years, and 100 percent after four years.
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account in which they have vested at any time.

Employer and employee contributions

- Employee contribution rate: 8 percent of salary
- Employer contribution rate: 5 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, a Detroit teacher receives the balance of her personal retirement account: her own contributions plus investment earnings, and all of the employer contributions plus investment earnings in which she is vested. After entering service, a teacher immediately vests in (or is eligible to receive) her own contributions. She fully vests in the employer contribution after four years, and partially vests before that. There are no age or years of service requirements for retirement.

The employer contribution rate is set at 5 percent of earnings. The employee contribution rate is set at 8 percent of earnings.

Detroit teachers do pay into Social Security.

Assumptions for Computing Retirement Benefit

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[9]
- Teacher salary schedule for 2012–13 school year[10]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[11] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[12]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Detroit Public Schools Community District

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 2,089	$ 2,089	$ 0
27	2	$ 6,015	$ 4,230	$ 1,784
28	3	$ 10,629	$ 6,478	$ 4,150
29	4	$ 16,464	$ 8,828	$ 7,636
30	5	$ 21,164	$ 11,283	$ 9,882
31	6	$ 26,694	$ 14,138	$ 12,556
32	7	$ 32,520	$ 17,115	$ 15,405
33	8	$ 38,654	$ 20,216	$ 18,439
34	9	$ 45,093	$ 23,436	$ 21,657
35	10	$ 52,435	$ 27,066	$ 25,369
36	11	$ 59,882	$ 30,711	$ 29,171
37	12	$ 67,438	$ 34,371	$ 33,067
38	13	$ 75,107	$ 38,050	$ 37,057
39	14	$ 82,894	$ 41,750	$ 41,144
40	15	$ 90,803	$ 45,472	$ 45,331
41	16	$ 98,839	$ 49,219	$ 49,621
42	17	$ 107,007	$ 52,993	$ 54,014
43	18	$ 115,311	$ 56,796	$ 58,515
44	19	$ 123,757	$ 60,631	$ 63,126
45	20	$ 132,349	$ 64,499	$ 67,849
46	21	$ 141,092	$ 68,404	$ 72,688
47	22	$ 149,991	$ 72,347	$ 77,644
48	23	$ 159,052	$ 76,330	$ 82,722
49	24	$ 168,280	$ 80,357	$ 87,923
50	25	$ 177,680	$ 84,429	$ 93,251

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $21,164 (A) and her cumulative contributions are worth $11,283 (B). Her net pension wealth accrued at this point is $9,882, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

1 In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

2 "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

3 Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

4 A vested teacher who leaves a DB pension plan before reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

5 Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See Appendix B.

6 The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

7 S. Provasnik and S. Dorfman, Mobility in the Teacher Workforce (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

8 NCES, Digest of Education Statistics, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

9 According to the Beginning Teacher Longitudinal Study, 80 percent of beginning teachers had a bachelor's degree. See NCES, Beginning Teacher Longitudinal Study, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

10 "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," Education Finance and Policy 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

11 For example, some districts specify longevity payments in the contract instead of in the salary schedule.

12 NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

COLUMBUS CITY SCHOOLS (OHIO)

SUMMARY

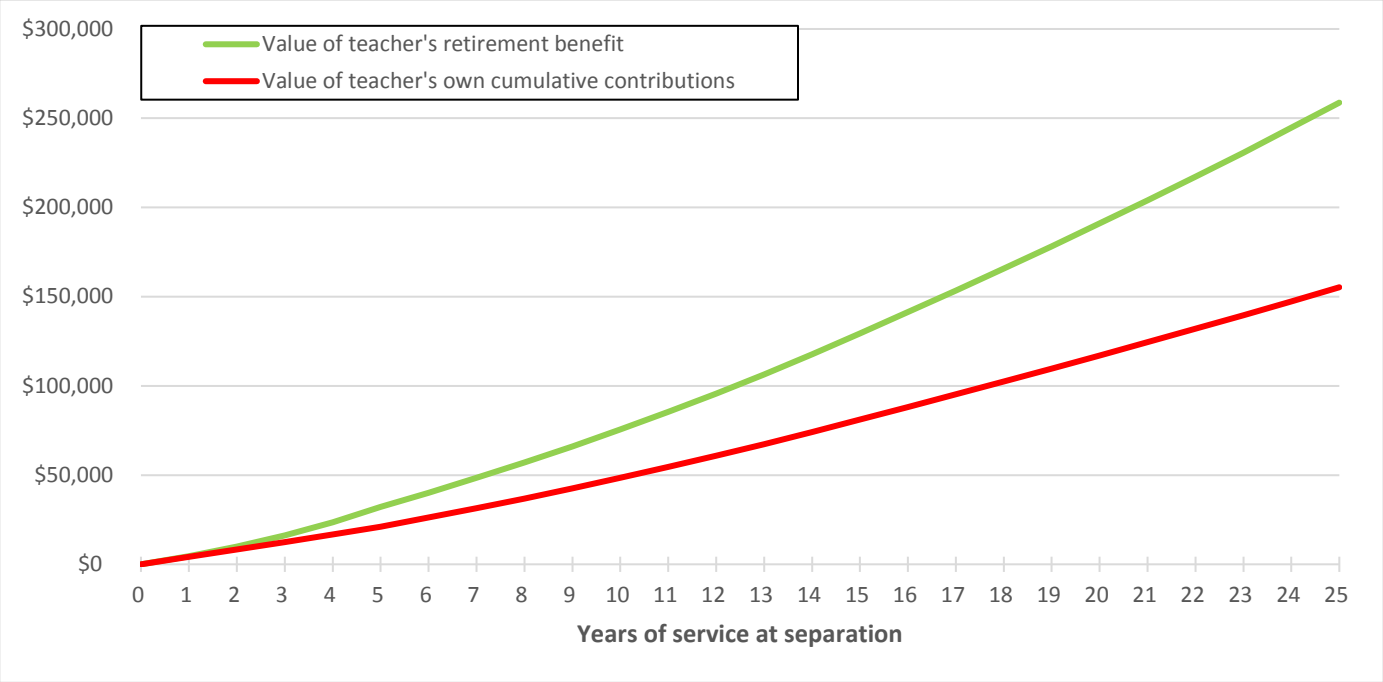
Columbus City Schools teachers can enroll in a defined contribution plan in the State Teachers Retirement System of Ohio. There is no crossover point for this plan because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere. (Columbus teachers may also choose a traditional defined benefit plan or a hybrid plan rather than a DC.)

About the District	
Students	50,478
Teachers (FTE)	3,074

About the Retirement Plan	
Type	Defined contribution
Coverage	Teachers
Active members	164,925
Total members	509,310

Sources: Enrollment: NCES (2013–14). Retirement plan membership: STRS Ohio Comprehensive Annual Financial Report (membership as of July, 2015; includes all members of STRS regardless of plan type)

Figure 1: A new teacher in Columbus City Schools who chooses the DC plan realizes a return on her contributions immediately, and her net benefit grows over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For a Columbus teacher who selects the defined contribution plan, there is no crossover point—her retirement benefit (green line) is always worth more than her cumulative contributions (red line), and her "net benefit" (the difference between the two) is always positive. She does not have to work a specified number of years in order to receive the balance of her retirement account, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[3] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[4] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[5] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[6] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Columbus teacher who selects the DC plan is always eligible to receive her contributions plus investment earnings on those contributions. This representative teacher is also immediately and completely vested into the employer contribution, meaning her benefit also always includes the employer contribution plus investment earnings.[7] After three years, the value of her contributions is $12,393 and the balance of her retirement account is $16,201. The net benefit (benefit minus contributions) is $3,808.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 16,201	$ 12,393	$ 3,808
40	15	$ 129,442	$ 81,062	$ 48,380
50	25	$ 258,724	$ 155,256	$ 103,468

MID-CAREER

Although there is no financial penalty for leaving the system early—under the DC plan, a Columbus teacher's net benefit is always positive—her net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] At this point she has contributed a total of $81,062 to the account, and her retirement benefit is worth $129,442—nearly $50,000 more than her cumulative contributions.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] Should a Columbus teacher who selects the DC plan stay 25 years, the balance of her retirement account has had even more time to grow. Her contributions are worth $155,256, and the value of her retirement account is now $258,724, with a net benefit of $103,468.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. A Columbus teacher who opts for the state's defined contribution plan can separate from the system at any point and her retirement benefit will be worth more than her contributions. She can always leave without financial penalty, and she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for Ohio teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

TECHNICAL MATTERS

Retirement System

Teachers working in Columbus City Schools can opt for the State Teachers Retirement System of Ohio's defined benefit plan, in which a teacher's retirement benefit is equal to her account balance when she separates from the system. (Columbus teachers may instead enroll in a traditional defined benefit plan or a hybrid plan rather than the DC plan.)

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Teachers hired prior to July 1, 2013 immediately vest in their own contributions and employer contributions plus investment earnings.[10]
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions

- Employee contribution rate: 10 percent of salary
- Employer contribution rate: 5 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, a Columbus teacher receives the balance of her personal retirement account: her own contributions plus investment earnings, and all of the employer contributions plus investment earnings. A teacher who was hired prior to July 1, 2013 immediately vests in (or is eligible to receive) all her own contributions and those of her employer. There are no age or years of service requirements for retirement.

The employer contribution rate is set at 5 percent of earnings. The employee contribution rate is set at 10 percent of earnings.

Columbus teachers do not pay into Social Security.

Assumptions for Computing Retirement Benefit

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Teacher salary schedule for 2012–13 school year[12]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[13] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[14]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Columbus City Schools

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 4,543	$ 4,130	$ 413
27	2	$ 9,932	$ 8,260	$ 1,672
28	3	$ 16,201	$ 12,393	$ 3,808
29	4	$ 23,602	$ 16,682	$ 6,919
30	5	$ 32,229	$ 21,135	$ 11,093
31	6	$ 40,140	$ 26,202	$ 13,938
32	7	$ 48,415	$ 31,459	$ 16,956
33	8	$ 57,066	$ 36,911	$ 20,154
34	9	$ 66,105	$ 42,564	$ 23,541
35	10	$ 75,552	$ 48,425	$ 27,127
36	11	$ 85,420	$ 54,500	$ 30,920
37	12	$ 95,727	$ 60,795	$ 34,932
38	13	$ 106,488	$ 67,316	$ 39,172
39	14	$ 117,720	$ 74,069	$ 43,651
40	15	$ 129,442	$ 81,062	$ 48,380
41	16	$ 141,347	$ 88,113	$ 53,234
42	17	$ 153,457	$ 95,234	$ 58,223
43	18	$ 165,740	$ 102,407	$ 63,333
44	19	$ 178,205	$ 109,637	$ 68,568
45	20	$ 191,024	$ 117,020	$ 74,004
46	21	$ 204,041	$ 124,468	$ 79,573
47	22	$ 217,263	$ 131,986	$ 85,277
48	23	$ 230,698	$ 139,577	$ 91,121
49	24	$ 244,595	$ 147,375	$ 97,220
50	25	$ 258,724	$ 155,256	$ 103,468

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $32,229 (A) and her cumulative contributions are worth $21,135 (B). Her net pension wealth accrued at this point is $11,093, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

[2] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[3] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[4] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[5] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[6] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[7] The representative teacher used for these calculations begins teaching in FY13. Immediate vesting in employer contributions applies only to teachers hired before July 1, 2013. Members hired after that date vest in the employer contribution at a rate of 20 percent per year.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] Members hired after July 1, 2013 vest in the employer contribution at a rate of 20 percent per year.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[14] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

GREENVILLE COUNTY SCHOOLS (SOUTH CAROLINA)

SUMMARY

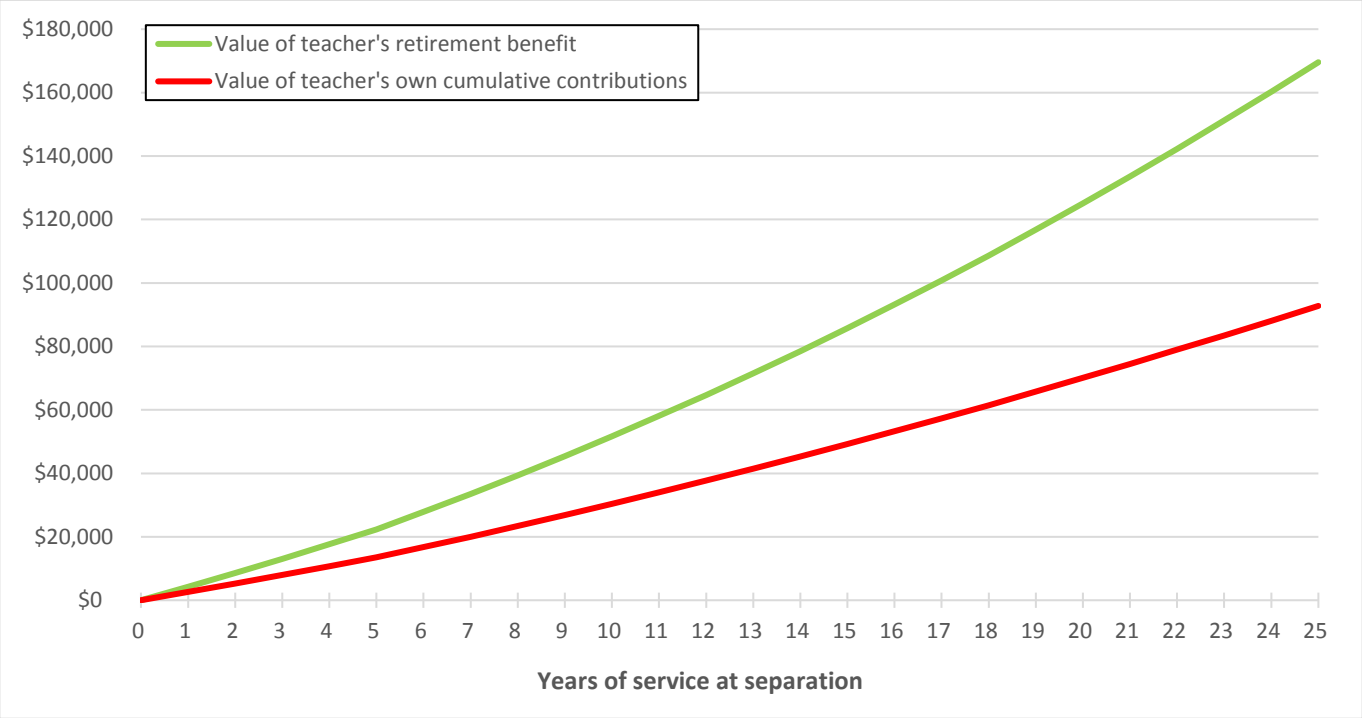
Greenville County teachers can enroll in the State Optional Retirement Plan (ORP), a defined contribution plan. There is no crossover point for this plan because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere. (Greenville County teachers may choose a traditional defined benefit plan rather than the ORP.)

About the District	
Students	74,475
Teachers (FTE)	4,462

About the Retirement Plan	
Type	Defined contribution
Coverage	Public employees
Active members	26,575
Total members	57,433

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Financial Statements, South Carolina Retirement Systems (membership as of July, 2015; includes only members of the DC plan)

Figure 1: A new teacher in Greenville County who chooses the DC plan realizes a return on her contributions immediately, and her net benefit grows over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For a Greenville County teacher who selects the defined contribution plan, there is no crossover point—her retirement benefit (green line) is always worth more than her cumulative contributions (red line), and her "net benefit" (the difference between the two) is always positive. She does not have to work a specified number of years in order to receive the balance of her retirement account, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[3] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[4] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[5] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[6] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Greenville County teacher who selects the DC plan is always eligible to receive her contributions plus investment earnings on those contributions. She is also immediately and completely vested into the employer contribution, meaning her benefit also always includes the employer contribution plus investment earnings. After three years, the value of her contributions is $7,969 and the balance of her retirement account is $13,072. The net benefit (benefit minus contributions) is $5,104.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 13,072	$ 7,969	$ 5,104
40	15	$ 85,747	$ 49,226	$ 36,520
50	25	$ 169,582	$ 92,773	$ 76,810

MID-CAREER

Although there is no financial penalty for leaving the system early—under the DC plan, a Greenville County teacher's net benefit is always positive—her net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[7] At this point she has contributed a total of $45,302 to the account, and her retirement benefit is worth $78,522; her investment has grown nearly 75 percent.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[8] Should a Greenville County teacher who selects the DC plan stay 25 years, the balance of her retirement account has had even more time to grow. Her contributions are worth $92,773, and the value of her retirement account is now $169,582.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. A Greenville County teacher who opts for the state's defined contribution plan can separate from the system at any point and her retirement benefit will be worth more than her contributions. She can always leave without financial penalty, and she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for South Carolina teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

TECHNICAL MATTERS

Retirement System

Teachers working in Greenville County can opt for the State Optional Retirement Plan (ORP), a defined contribution plan in which a teacher's retirement benefit is equal to her account balance when she separates from the system. Upon separation, employees may choose among a set of several payment options that include a lump-sum payment and converting the account's balance to a single life annuity. (Greenville County teachers may instead enroll in a traditional defined benefit plan, rather than the ORP.)

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Teachers immediately vest in their own contributions and employer contributions plus investment earnings.
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions

- Employee contribution rate: 8 percent of salary
- Employer contribution rate: 5 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, a Greenville County teacher receives the balance of her personal retirement account: her own contributions plus investment earnings, and all of the employer contributions plus investment earnings. After entering service, a teacher immediately vests in (or is eligible to receive) her own contributions and those of her employer. There are no age or years of service requirements for retirement.

The employer contribution rate is set at 5 percent of earnings. The employee contribution rate is set at 8 percent of earnings.

Greenville County teachers do pay into Social Security.

Assumptions for Computing Retirement Benefit

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[9]
- Teacher salary schedule for 2012–13 school year[10]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[11] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[12]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in Greenville County Schools

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 4,218	$ 2,596	$ 1,622
27	2	$ 8,567	$ 5,247	$ 3,320
28	3	$ 13,072	$ 7,969	$ 5,104
29	4	$ 17,624	$ 10,693	$ 6,931
30	5	$ 22,333	$ 13,486	$ 8,847
31	6	$ 27,830	$ 16,716	$ 11,114
32	7	$ 33,508	$ 20,022	$ 13,486
33	8	$ 39,367	$ 23,403	$ 15,964
34	9	$ 45,412	$ 26,860	$ 18,552
35	10	$ 51,644	$ 30,394	$ 21,251
36	11	$ 58,068	$ 34,004	$ 24,064
37	12	$ 64,687	$ 37,691	$ 26,995
38	13	$ 71,503	$ 41,457	$ 30,046
39	14	$ 78,522	$ 45,302	$ 33,220
40	15	$ 85,747	$ 49,226	$ 36,520
41	16	$ 93,181	$ 53,231	$ 39,950
42	17	$ 100,830	$ 57,318	$ 43,511
43	18	$ 108,696	$ 61,488	$ 47,208
44	19	$ 116,786	$ 65,742	$ 51,044
45	20	$ 125,093	$ 70,076	$ 55,018
46	21	$ 133,591	$ 74,475	$ 59,115
47	22	$ 142,283	$ 78,943	$ 63,340
48	23	$ 151,175	$ 83,480	$ 67,695
49	24	$ 160,272	$ 88,089	$ 72,183
50	25	$ 169,582	$ 92,773	$ 76,810

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $22,333 (A) and her cumulative contributions are worth $13,486 (B). Her net pension wealth accrued at this point is $8,847, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

[2] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[3] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[4] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[5] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[6] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[7] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[8] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[9] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[10] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[11] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[12] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

ALPINE SCHOOL DISTRICT (UTAH)

SUMMARY

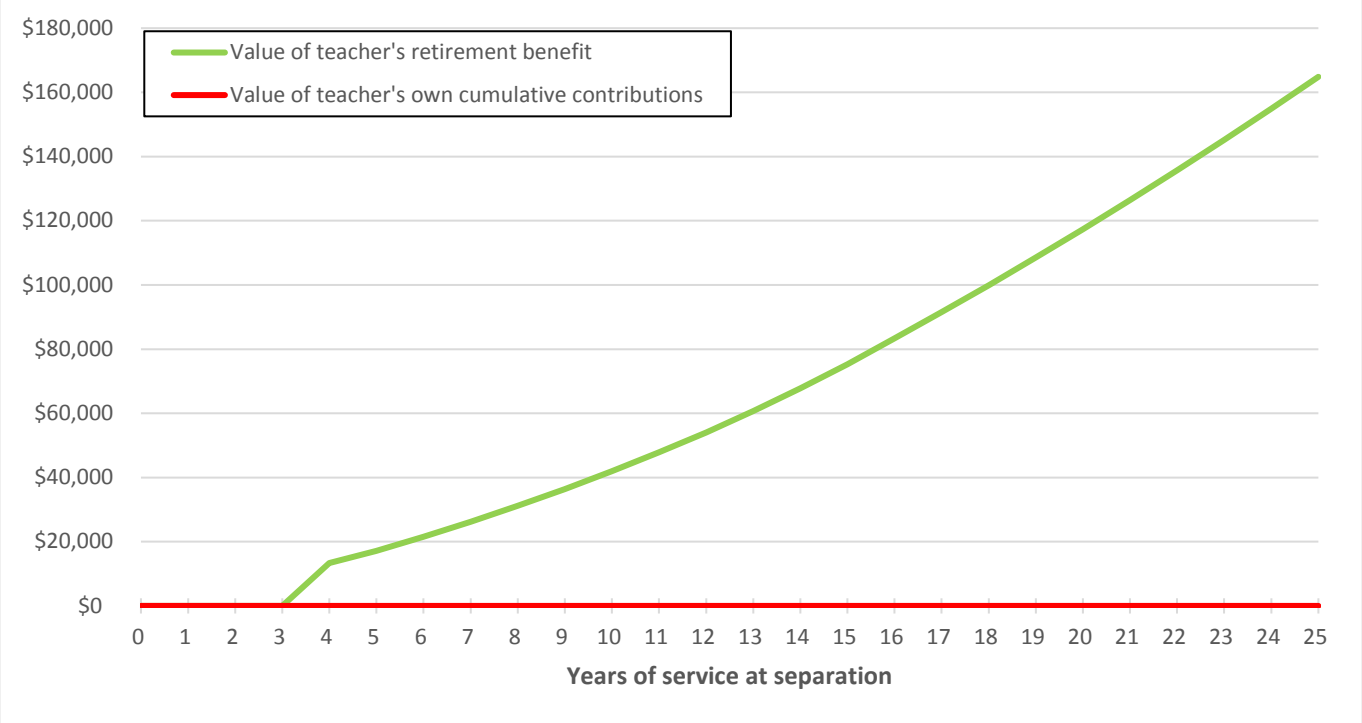
Alpine School District teachers can enroll in Utah Retirement Systems' Tier 2 Defined Contribution Plan. There is no crossover point for this plan because, under a defined contribution plan, benefits are solely based on an individual teacher's retirement account balance, equal to her and her employer's contributions plus interest and investment earnings. A teacher's benefit is worth more than her cumulative contributions, and her net benefit is positive and grows the longer she stays.[1] At the same time, she bears no penalty for separating with only a few years of service and moving her investment elsewhere. (Alpine teachers may choose the Tier 2 Hybrid Retirement System rather than the DC plan.)

About the District	
Students	73,975
Teachers (FTE)	3,078

About the Retirement Plan	
Type	Defined contribution
Coverage	Public employees
Active members	40,550
Total members	40,550

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Utah Retirement Systems (membership as of December, 2015; includes only members of the DC plan)

Figure 1: Once vested, a new teacher in the Alpine School District who chooses the DC plan realizes a positive net benefit that continues to grow over time.



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service.[2] (In this case, only the employer is required to contribute to Utah's DC plan, so the teacher's cumulative contributions always equal zero.)[3] The green line is the value of her lump-sum retirement benefit should she separate from the system at a given time. Said another way, her benefit is equal to the balance of her retirement account at the time she separates: all of her contributions, the portion of the employer contributions in which she is currently vested, and the earnings on those contributions (interest and increased investment value). Where the green line jumps quickly away from $0 is the time at which she vests. Because we assume a constant 5 percent return on investment, the balance of her retirement account accrues in a fairly smooth manner over time.

For an Alpine teacher who selects the defined contribution plan, there is no crossover point—the value of her retirement benefit (green line) is never less than the value of her cumulative contributions (red line), and her "net benefit" (the difference between the two) is never negative. She does not have to work a specified number of years in order to receive the balance of her retirement account in which she is vested, or to transfer it to another system. Said another way, she can separate from the system at any time without incurring a financial penalty. Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Alpine teacher who selects the DC plan is always eligible to receive her contributions plus investment earnings on those contributions, should she choose to make any. If she leaves after three years of service (or at any point before the vesting point of four years), she is not eligible to receive retirement benefits at all, because she has not vested into the employer contribution and she is not required to make a contribution herself (Table 1). After four years, she is now vested into the employer contribution and her benefit is equal to the balance of her retirement account ($13,381). The net benefit (benefit minus contributions) is also $13,381, since her own contribution is zero.

Table 1. At key points in a teacher's career, what is the value of her retirement benefit? What is the value of her contribution? And what is the difference between the two?

Age	Years of Service	Value of teacher's pension benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
28	3	$ 0	$ 0	$ 0
29	4	$ 13,381	$ 0	$13,381
40	15	$ 75,315	$ 0	$ 75,315
50	25	$ 164,848	$ 0	$ 164,848

MID-CAREER

Although there is no financial penalty for leaving the system early—under the DC plan, an Alpine teacher's net benefit is never negative—her net benefit increases the longer she stays. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[8] At this point her retirement benefit is worth $75,315.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[9] Should an Alpine teacher who selects the DC plan stay 25 years, the balance of her retirement account (and her net benefit) has had even more time to grow. The account is now worth $164,848.

Bottom line: In this defined contribution plan, there is no penalty for leaving early, nor an incentive to quit earlier or stay longer than a teacher desires. An Alpine teacher who opts for the state's defined contribution plan can separate from the system at any point without financial penalty, and once vested she is free to transfer the balance of her retirement account to another system. The DC plan is portable and offers a chance for Utah teachers to save toward a secure retirement and choose the plan that fits their own life circumstances, career goals, and preferences.

TECHNICAL MATTERS

Retirement System

Teachers working in the Alpine School District teachers can opt for the Utah Retirement Systems' Tier 2 Defined Contribution Plan. Under this defined contribution plan, a teacher's retirement benefit is equal to her account balance when she separates from the system. (Alpine teachers may choose the Tier 2 Hybrid Retirement System rather than the DC plan.)

Plan Provisions by the Numbers

Eligibility for retirement benefits

- Vesting requirement: Four years
- Retirement eligibility: No age or years of service requirements.

Employer and employee contributions

- Employee contribution rate: none required
- Employer contribution rate: 10 percent of salary

Summary of Plan Provisions

Upon leaving the retirement system, an Alpine teacher receives the balance of her personal retirement account: her own contributions plus investment earnings (should she make any contributions), and all of the employer contributions plus investment earnings in which she is vested. After entering service, a teacher immediately vests in (or is eligible to receive) her own contributions, although these contributions are not required. She vests in the employer contribution after four years. There are no age or years of service requirements for retirement.

The employer contribution rate is set at 10 percent of earnings. There is no required employee contribution.

Alpine teachers do pay into Social Security.

Assumptions for Computing Retirement Benefit

Note: For DC plans, retirement benefit is equal to the balance of the teacher's retirement account

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[10]
- Teacher salary schedule for 2012–13 school year[11]
- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[12] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[13]

Table 2: Benefits, contributions, and net benefit for a representative new teacher in the Alpine School District

Age	Years of Service	Value of teacher's retirement benefit (A)	Value of teacher's cumulative contributions to date (B)	Net benefit (A-B)
25	0	$ 0	$ 0	$ 0
26	1	$ 0	$ 0	$ 0
27	2	$ 0	$ 0	$ 0
28	3	$ 0	$ 0	$ 0
29	4	$ 13,381	$ 0	$ 13,381
30	5	$ 17,164	$ 0	$ 17,164
31	6	$ 21,543	$ 0	$ 21,543
32	7	$ 26,204	$ 0	$ 26,204
33	8	$ 31,155	$ 0	$ 31,155
34	9	$ 36,403	$ 0	$ 36,403
35	10	$ 41,955	$ 0	$ 41,955
36	11	$ 47,819	$ 0	$ 47,819
37	12	$ 54,077	$ 0	$ 54,077
38	13	$ 60,739	$ 0	$ 60,739
39	14	$ 67,815	$ 0	$ 67,815
40	15	$ 75,315	$ 0	$ 75,315
41	16	$ 83,329	$ 0	$ 83,329
42	17	$ 91,538	$ 0	$ 91,538
43	18	$ 99,948	$ 0	$ 99,948
44	19	$ 108,563	$ 0	$ 108,563
45	20	$ 117,388	$ 0	$ 117,388
46	21	$ 126,428	$ 0	$ 126,428
47	22	$ 135,688	$ 0	$ 135,688
48	23	$ 145,175	$ 0	$ 145,175
49	24	$ 154,893	$ 0	$ 154,893
50	25	$ 164,848	$ 0	$ 164,848

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $17,164 (A) and her cumulative contributions are worth $0 (B). Her net pension wealth accrued at this point is $17,164, which is her pension wealth minus her cumulative contributions (A-B). All values are adjusted for inflation.

ENDNOTES

[1] In practice, it is possible that investment returns over some period of time are sufficiently negative such that a teacher's net benefit could also be negative. However, in the long run, net benefit is likely to be positive (especially if it factors in employer contributions). For this description, we assume a positive long-term net benefit.

[2] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[3] There is no required employee contribution. In this study, the contribution rate for teachers in DC plans equals the minimum amount required.

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[9] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[10] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016). Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[11] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[12] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[13] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

INDIANAPOLIS PUBLIC SCHOOLS (INDIANA)

SUMMARY

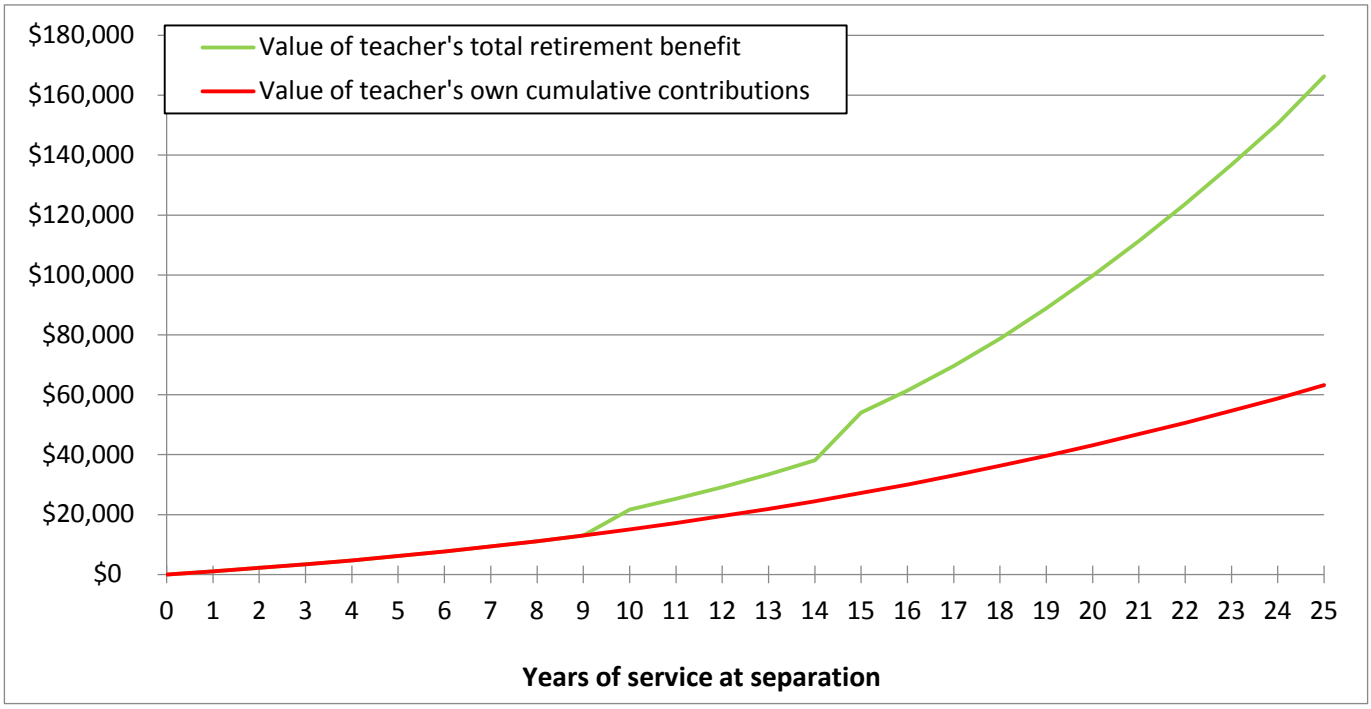
Teachers working in Indianapolis Public Schools belong to the Indiana State Teachers' Retirement Fund, a hybrid plan composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account called the Annuity Savings Account (ASA). In Indianapolis, the crossover point occurs after 10 years of service, meaning that a teacher must remain in the system 10 years before her total benefit is worth more than her cumulative contributions. This is also equivalent to the vesting period of the DB portion of the plan. A crossover point corresponding to the vesting period is typical of the hybrid plans in which the teacher contributes only to the defined contribution portion, and the employer to the defined benefit portion, of the plan.

About the District	
Students	30,813
Teachers (FTE)	2,498

About the Retirement Plan	
Type	Hybrid
Coverage	Teachers
Active members	70,573
Total members	140,233

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Indianapolis Public Schools must remain in the retirement system for 10 years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the plan), plus the value of her pension (the DB portion). Where the red line lies directly on top of the green, the value of a teacher's contributions is the same as her total benefit. In other words, her net benefit is zero. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[1] In Indianapolis, a new teacher must stay 10 years to reach the crossover point (where the green line is above the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account (the DC portion of the hybrid). This portion of her benefit is portable and has no vesting period. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[2] But she is not eligible for any pension benefits until she vests, which is represented in the figure at the point where the green line diverges from the red. (Once vested, she would not start receiving pension benefits until she reaches the age of retirement eligibility, even if she leaves the system before that.) DB benefits increase in value the longer she stays.[3] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

An Indianapolis teacher who leaves after **five years** of service (or at any point before the DB vesting point of 10 years) is only eligible to receive the DC portion of her retirement benefit. Her pension wealth is zero. But even if she separates from the system after only five years, she is still eligible for the balance in her retirement account, equal to $6,126, which consists of her contributions plus investment earnings. Her net benefit before vesting is zero, because the total value of her benefits is equal to the value of her cumulative contributions.

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each component of her hybrid plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
30	5	$ 0	$ 6,126	$ 6,126	$ 6,126	$ 0
35	10	$ 6,647	$ 15,050	$ 21,697	$ 15,050	$ 6,647
40	15	$ 26,813	$ 27,164	$ 53,977	$ 27,164	$ 26,813
50	25	$ 103,174	$ 63,172	$ 166,346	$ 63,172	$ 103,174

AT THE CROSSOVER

After 10 years, an Indianapolis teacher reaches the crossover point, meaning her total benefit is worth more than her cumulative contributions and her net benefit becomes positive. This corresponds to the vesting period of the DB portion of the hybrid plan. After 10 years, a teacher's total retirement benefit is worth $21,697—the balance of her retirement account ($15,050) plus the value of her pension benefit ($6,647).

After 10 years (and for the remainder of her career), her net benefit is positive. Her net benefit is also equal to the value of her DB benefit, because her DC benefit is exactly equal to the value of her cumulative contributions. However, while she is always eligible to receive her DC benefit, she must wait to receive her DB benefit until she reaches retirement age.[8]

MID-CAREER

Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her total retirement benefit is worth $53,977, about 50 percent of which is from the DB portion of the plan and the remainder from the DC portion. Her net benefit is $26,813, again equivalent to the benefit from the DB portion.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] Should an Indianapolis teacher stay 25 years, her net benefit is much larger than it was mid-career. After 25 years, an Indianapolis teacher's total benefit is worth $166,346, with 62 percent of that from the DB portion of the plan.

Bottom Line: An Indiana teacher who starts at age 25 under the Indianapolis Public Schools salary schedule must wait 10 years to reach the crossover point. The relatively short time to the crossover point is because of the DC

portion of her total benefit. The hybrid plan somewhat dampens a common feature of a traditional DB plan—namely, having a crossover point that does not occur until very late in a teacher's career. And, unlike teachers in a traditional DB plan (and even some other hybrids), if a teacher leaves the Indiana system before the crossover, at least her net benefit is zero (as opposed to negative).

TECHNICAL MATTERS

Retirement System

Indiana Public Schools teachers belong to the Indiana State Teachers' Retirement Fund, a hybrid plan composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account called the Annuity Savings Account (ASA). A teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her ASA account.

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of hybrid plan

- Vesting requirement: 10 years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/10; 60/15; 55/(Rule of 85)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 50/15

Employer and employee contributions: Defined benefit portion of hybrid plan

- Employee contribution rate: none
- Employer contribution rate: 7.5 percent of salary[11]
- Refundable contributions: n/a

Benefit formula: Defined benefit portion of hybrid plan

The DB portion of a new teacher's retirement benefit is equal to the formula below:

Annual benefit = (1.1%) x (YOS) x (FAS)

Where YOS = number of years of service, and FAS = final average salary, the average of the five highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of hybrid plan

- Vesting requirement: Teachers immediately vest in their own contributions
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions: Defined contribution portion of hybrid plan

- Employee contribution rate: 3 percent of salary[12]
- Employer contribution rate: none required

Benefits: Defined contribution portion of hybrid plan

- The DC portion of a new teacher's retirement benefit is equal to the balance of her ASA account.

Summary of Plan Provisions

An Indianapolis teacher's hybrid plan benefits consists of two components: (1) a pension benefit (determined by a combination of age, years of service, and final average salary), and (2) the balance of her personal retirement account (her cumulative contributions, plus investment earnings).

Under normal retirement eligibility requirements, an Indianapolis teacher qualifies for full pension benefits at age 65 with 10 years of service, at age 60 with 15 years of service, or at age 55 such that the sum of her age and years of service is at least 85 (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.1 percent. A teacher vests into the pension portion after 10 years, meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement. The plan does offer reduced pension benefits for early retirement, available at age 50 with 15 years of service.

The employer contribution rate to the defined benefit portion is 7.5 percent of earnings. The employee contribution rate to the defined benefit portion is zero.

Upon leaving the retirement system, an Indianapolis teacher also receives the balance of her personal retirement account: her own contributions plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in her own contributions.

The employer contribution rate to the defined contribution portion is zero. The employee contribution rate to the defined contribution portion is set at 3 percent of earnings.[13]

Indianapolis teachers do pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[14]
- Teacher salary schedule for 2012–13 school year[15]

For DB Benefits:

- Survival probabilities from *2007 CDC Life Tables*[16]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC Benefits:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[17] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[18]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in Indianapolis Public Schools

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 1,044	$ 1,044	$ 1,044	$ 0
27	2	$ 0	$ 2,175	$ 2,175	$ 2,175	$ 0
28	3	$ 0	$ 3,397	$ 3,397	$ 3,397	$ 0
29	4	$ 0	$ 4,712	$ 4,712	$ 4,712	$ 0
30	5	$ 0	$ 6,126	$ 6,126	$ 6,126	$ 0
31	6	$ 0	$ 7,685	$ 7,685	$ 7,685	$ 0
32	7	$ 0	$ 9,353	$ 9,353	$ 9,353	$ 0
33	8	$ 0	$ 11,133	$ 11,133	$ 11,133	$ 0
34	9	$ 0	$ 13,031	$ 13,031	$ 13,031	$ 0
35	10	$ 6,647	$ 15,050	$ 21,697	$ 15,050	$ 6,647
36	11	$ 8,055	$ 17,197	$ 25,252	$ 17,197	$ 8,055
37	12	$ 9,673	$ 19,476	$ 29,149	$ 19,476	$ 9,673
38	13	$ 11,526	$ 21,893	$ 33,419	$ 21,893	$ 11,526
39	14	$ 13,643	$ 24,453	$ 38,096	$ 24,453	$ 13,643
40	15	$ 26,813	$ 27,164	$ 53,977	$ 27,164	$ 26,813
41	16	$ 31,396	$ 30,030	$ 61,426	$ 30,030	$ 31,396
42	17	$ 36,599	$ 33,058	$ 69,657	$ 33,058	$ 36,599
43	18	$ 42,496	$ 36,255	$ 78,751	$ 36,255	$ 42,496
44	19	$ 49,228	$ 39,639	$ 88,867	$ 39,639	$ 49,228
45	20	$ 56,558	$ 43,163	$ 99,721	$ 43,163	$ 56,558
46	21	$ 64,492	$ 46,834	$ 111,325	$ 46,834	$ 64,492
47	22	$ 73,029	$ 50,656	$ 123,685	$ 50,656	$ 73,029
48	23	$ 82,161	$ 54,637	$ 136,798	$ 54,637	$ 82,161
49	24	$ 91,775	$ 58,783	$ 150,557	$ 58,783	$ 91,775
50	25	$103,174	$ 63,172	$ 166,346	$ 63,172	$ 103,174

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $6,126 (A+B) and her cumulative contributions are worth $6,126 (C). Her net pension wealth accrued at this point is $0, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[2] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[3] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] Retirement age depends on years of service; see the "Technical Matters" section for more.

[9] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[10] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[11] The 7.5 percent rate applies only to the current "1996 Account" pension plan. Employers also make contributions to the closed "Pre-1996 Account" pension plan, so the actual employer contribution rate is much higher—27.69 percent of payroll total per the June 30, 2015 actuarial valuations for these plans.

[12] There is a 3 percent mandatory contribution to the ASA; employees make this contribution unless the employer opts to pick up all or part of it. Employees are also allowed to make voluntary contributions up to 10 percent of salary.

[13] See previous note.

[14] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[15] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[16] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[17] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[18] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

PORTLAND PUBLIC SCHOOLS (OREGON)

SUMMARY

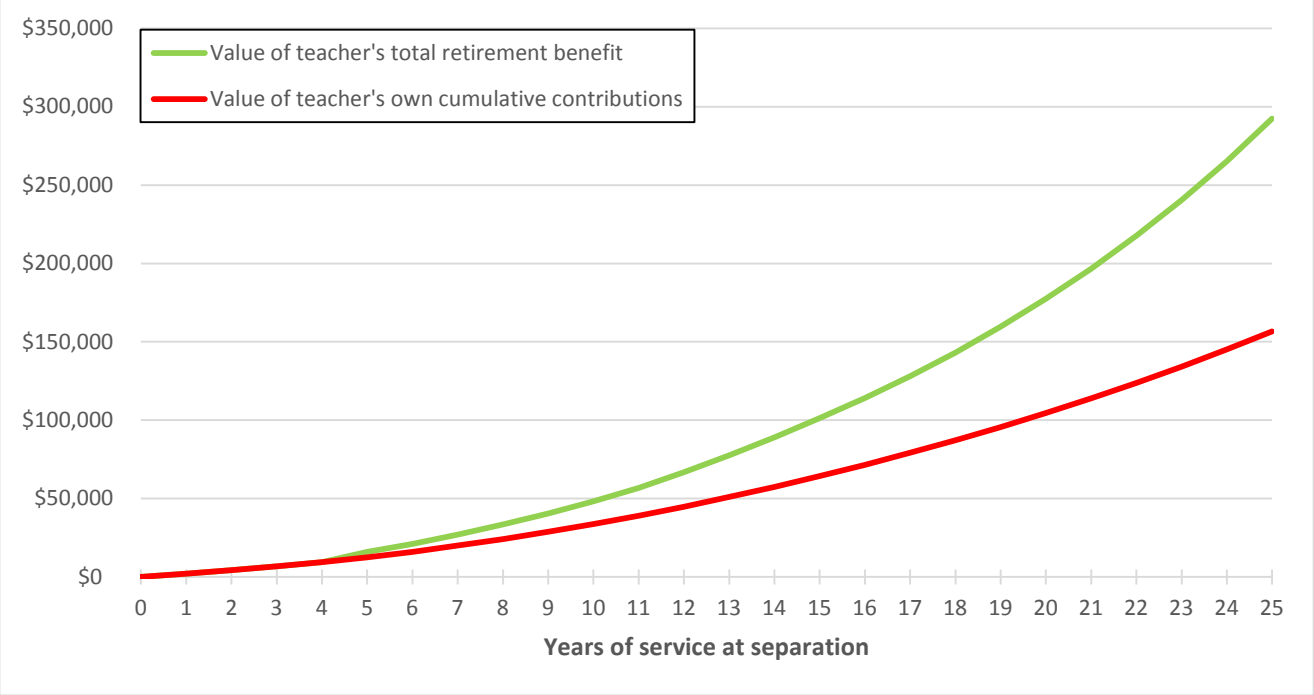
Teachers working in Portland Public Schools belong to the Oregon Public Employees Retirement System, a hybrid plan composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account called the Individual Account Program (IAP). In Portland, the crossover point occurs after five years of service, meaning that a teacher must remain in the system five years before her total benefit is worth more than her cumulative contributions. This is also equivalent to the vesting period of the DB portion of the plan. A crossover point corresponding to the vesting period is typical of the hybrid plans in which the teacher contributes only to the defined contribution portion, and the employer to the defined benefit portion, of the plan.

About the District	
Students	47,323
Teachers (FTE)	2,480

About the Retirement Plan	
Type	Hybrid
Coverage	Public employees
Active members	170,972
Total members	329,887

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Portland Public Schools must remain in the retirement system for five years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the plan), plus the value of her pension (the DB portion). Where the red line lies directly on top of the green, the value of a teacher's contributions is the same as her total benefit. In other words, her net benefit is zero. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[1] In Portland, a new teacher must stay five years to reach the crossover point (where the green line is above the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account (the DC portion of the hybrid plan). This portion of her benefits is portable and has no vesting period. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[2] But she is not eligible for any pension benefits until she vests, which is represented in the figure at the point where the green line diverges from the red. (Once vested, she would not start receiving pension benefits until she reaches the age of retirement eligibility, even if she leaves the system before that.) DB benefits increase in value the longer she stays.[3] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Portland teacher who leaves after **three years** of service (or at any point before the DB vesting point of five years) is only eligible to receive the DC portion of her retirement benefit. Her pension wealth is zero. But even if she separates from the system after only three years, she is still eligible for the balance in her retirement account, equal to $6,867, which consists of her contributions plus investment earnings. Her net benefit before vesting is zero, because the total value of her benefits is equal to the value of her cumulative contributions.

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each component of her hybrid plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
28	3	$ 0	$ 6,867	$ 6,867	$ 6,867	$ 0
30	5	$ 3,492	$ 12,472	$ 15,964	$ 12,472	$ 3,492
40	15	$ 36,895	$ 64,376	$ 101,271	$ 64,376	$ 36,895
50	25	$ 135,606	$ 156,655	$ 292,261	$ 156,655	$ 135,606

AT THE CROSSOVER

After five years, a Portland teacher reaches the crossover point, meaning her total benefit is worth more than her cumulative contributions and her net benefit becomes positive. This corresponds to the vesting period of the DB portion of the hybrid plan. After five years, a teacher's total retirement benefit is worth $15,964—the balance of her retirement account ($12,472) plus the value of her pension benefit ($3,492).

After five years (and for the remainder of her career), a Portland teacher's net benefit is positive. Her net benefit is also equal to the value of her DB benefit, because her DC benefit is exactly equal to the value of her cumulative contributions. However, while she is always eligible to receive her DC benefit, she must wait to receive her DB benefit until she reaches retirement age.[8]

MID-CAREER

Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her total retirement benefit is worth $101,271, about 36 percent of which is from the DB portion of the plan and the remainder from the DC portion. Her net benefit is $36,895, again equivalent to the benefit from the DB portion.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] Should a Portland teacher stay 25 years, her net benefit is much larger than it was mid-career. After 25 years, a Portland teacher's total benefit is worth $292,261, with 46 percent of that from the DB portion of the plan.

Bottom Line: An Oregon teacher who starts at age 25 under the Portland Public Schools salary schedule must wait five years to reach the crossover point. The relatively short time to the crossover point is because of the DC portion of her total benefit. The hybrid plan somewhat dampens a common feature of a traditional DB plan—namely,

having a crossover point that does not occur until very late in a teacher's career. And, unlike teachers in a traditional DB plan (and even some other hybrids), if a teacher leaves the Oregon system before the crossover, at least her net benefit is zero (as opposed to negative).

TECHNICAL MATTERS

Retirement System

Portland Public Schools teachers belong to the Oregon Public Employees Retirement System, a hybrid plan composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account called the Individual Account Program (IAP). A teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her IAP account.

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of hybrid plan

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): 65/5; 58/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/5

Employer and employee contributions: Defined benefit portion of hybrid plan

- Employee contribution rate: none
- Employer contribution rate: 24.1 percent of salary
- Refundable contributions: n/a

Benefit formula: Defined benefit portion of hybrid plan

The DB portion of a new teacher's retirement benefit is equal to the formula below:

Annual benefit = (1.5%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the three highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of hybrid plan

- Vesting requirement: Teachers immediately vest in their own contributions
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions: Defined contribution portion of hybrid plan

- Employee contribution rate: 6 percent of salary
- Employer contribution rate: none

Benefits: Defined contribution portion of hybrid plan

The DC portion of a new teacher's retirement benefit is equal to the balance of her retirement account.

Summary of Plan Provisions

A Portland teacher's hybrid plan benefits consists of two components: (1) a pension benefit (determined by a combination of age, years of service, and final average salary), and (2) the balance of her personal retirement account (her cumulative contributions, plus investment earnings).

Under normal retirement eligibility requirements, a Portland teacher qualifies for full pension benefits at age 65 with five years of service, or at age 58 with 30 years of service (whichever comes first). The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 1.5 percent. A teacher vests into the pension portion after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement. The plan does offer reduced pension benefits for early retirement, available at age 55 with 5 years of service.

The employer contribution rate to the defined benefit portion is 24.1 percent of earnings. The employee contribution rate to the defined benefit portion is zero.

Upon leaving the retirement system, a Portland teacher also receives the balance of her personal retirement account: her own contributions plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in her own contributions.

The employer contribution rate to the defined contribution portion is zero. The employee contribution rate to the defined contribution portion is set at 6 percent of earnings.

Portland teachers do pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Teacher salary schedule for 2012–13 school year[12]

For DB benefits:

- Survival probabilities from *2007 CDC Life Tables*[13]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC benefits:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in Portland Public Schools

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,101	$ 2,101	$ 2,101	$ 0
27	2	$ 0	$ 4,385	$ 4,385	$ 4,385	$ 0
28	3	$ 0	$ 6,867	$ 6,867	$ 6,867	$ 0
29	4	$ 0	$ 9,557	$ 9,557	$ 9,557	$ 0
30	5	$ 3,492	$ 12,472	$ 15,964	$ 12,472	$ 3,492
31	6	$ 5,001	$ 16,102	$ 21,103	$ 16,102	$ 5,001
32	7	$ 6,911	$ 20,027	$ 26,938	$ 20,027	$ 6,911
33	8	$ 9,298	$ 24,267	$ 33,566	$ 24,267	$ 9,298
34	9	$ 11,691	$ 28,843	$ 40,533	$ 28,843	$ 11,691
35	10	$ 14,518	$ 33,775	$ 48,293	$ 33,775	$ 14,518
36	11	$ 17,849	$ 39,087	$ 56,936	$ 39,087	$ 17,849
37	12	$ 21,905	$ 44,869	$ 66,774	$ 44,869	$ 21,905
38	13	$ 26,559	$ 51,034	$ 77,593	$ 51,034	$ 26,559
39	14	$ 31,642	$ 57,531	$ 89,173	$ 57,531	$ 31,642
40	15	$ 36,895	$ 64,376	$ 101,271	$ 64,376	$ 36,895
41	16	$ 42,562	$ 71,588	$ 114,149	$ 71,588	$ 42,562
42	17	$ 48,913	$ 79,187	$ 128,100	$ 79,187	$ 48,913
43	18	$ 56,025	$ 87,194	$ 143,219	$ 87,194	$ 56,025
44	19	$ 63,985	$ 95,631	$ 159,615	$ 95,631	$ 63,985
45	20	$ 72,886	$ 104,520	$ 177,406	$ 104,520	$ 72,886
46	21	$ 82,833	$ 113,887	$ 196,720	$ 113,887	$ 82,833
47	22	$ 93,943	$ 123,756	$ 217,698	$ 123,756	$ 93,943
48	23	$ 106,343	$ 134,154	$ 240,497	$ 134,154	$ 106,343
49	24	$ 120,177	$ 145,111	$ 265,288	$ 145,111	$ 120,177
50	25	$ 135,606	$ 156,655	$ 292,261	$ 156,655	$ 135,606

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $15,964 (A+B) and her cumulative contributions are worth $12,472 (C). Her net pension wealth accrued at this point is $3,492, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[2] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[3] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] Retirement age depends on years of service; see the "Technical Matters" section for more.

[9] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[10] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

PROVIDENCE PUBLIC SCHOOL DISTRICT (RHODE ISLAND)

SUMMARY

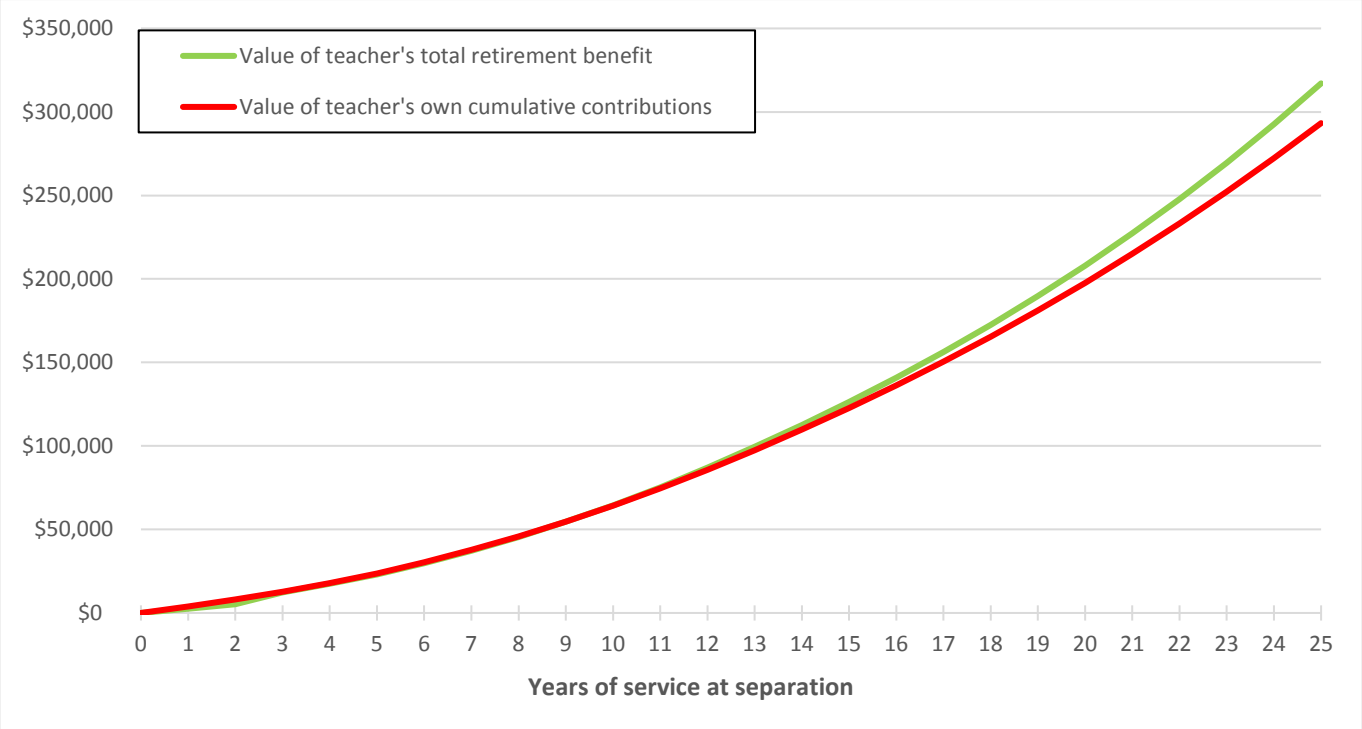
Teachers working in the Providence Public School District belong to the Employees' Retirement System of Rhode Island, a hybrid plan composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account. In Providence, the crossover point occurs after 10 years of service, meaning that a teacher must remain in the system 10 years before her total benefit is worth more than her total cumulative contributions. Because of the structure and parameters of this plan, prior to the crossover point her net benefit is *negative* (whereas it is zero for some of the other hybrid plans in this study).

About the District	
Students	23,827
Teachers (FTE)	1,394

About the Retirement Plan	
Type	Hybrid
Coverage	Public employees
Active members	13,212
Total members	26,642

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; includes all members)

Figure 1: A new teacher in the Providence Public School District must remain in the retirement system for 10 years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the plan), plus the value of her pension (the DB portion). Where the green line lies below the red, the value of a teacher's total benefit is less than her cumulative contributions. In other words, her net benefit is negative. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[1] In Providence, a new teacher must stay 10 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account: her contributions to the DC portion of the plan and the portion of her employer's contribution in which she is vested, plus investment earnings. This portion of her benefit is portable. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[2] She is not eligible for any pension benefits until she vests into the DB portion. Once vested, she still would not start receiving benefits from the DB portion until she reaches the age of retirement eligibility, even if she leaves the system before that. DB benefits increase in value the longer she stays.[3] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Providence teacher who leaves after **two years** of service is only eligible to receive her own contributions to her retirement account, plus investment earnings. Her total benefit at this point is equal to balance of her retirement account ($5,250). She has not vested into any of her employer's contributions to either portion of the plan, but she has contributed to both portions. Her cumulative contributions to both parts ($8,062) are worth less than her benefit from both parts ($5,250), and her overall net benefit is negative (-$2,812).

She must stay three years to vest in her employer's contribution to the DC portion and five years in order to vest in the DB portion of the hybrid. (In reality, should this teacher separate from the system before she vests, she would take a refund of her contributions to the DB portion, which she would be given without interest.)

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each component of her hybrid plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
27	2	$ 0	$ 5,250	$ 5,250	$ 8,062	-$ 2,812
35	10	$ 4,735	$ 59,764	$ 64,499	$ 64,246	$ 253
40	15	$ 12,217	$ 114,089	$ 126,307	$ 122,646	$ 3,661
50	25	$ 44,282	$ 272,821	$ 317,103	$ 293,283	$ 23,820

AT THE CROSSOVER

After 10 years, a Providence teacher reaches the crossover point, meaning her total benefit is worth more than cumulative contributions and her net benefit becomes positive. After 10 years, a teacher's total retirement benefit is worth $64,499—the balance of her retirement account ($59,764) plus the value of her pension benefits ($4,735). After 10 years (and for the remainder of her career), a Providence teacher's net benefit is positive. However, while she is always eligible to receive her DC benefit, she must wait to receive her DB benefit until she reaches retirement age.[8]

MID-CAREER

Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her total retirement benefit is worth $126,307, about 10 percent of which is from the DB portion of the plan and the remainder from the DC portion. Her net benefit is a modest $3,661.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] Should a Providence teacher stay 25 years, because of the plan parameters her net benefit ($23,820) is still relatively small. At this point, her total benefit is worth $317,103, with 14 percent of that from the DB portion of the plan. Her cumulative contributions are worth $293,283.

Bottom Line: A Rhode Island teacher who starts at age 25 under the Providence Public School District salary schedule must wait 10 years to reach the crossover point. The relatively short time to the crossover point is because of the DC portion of her total benefit. The hybrid plan somewhat dampens a common feature of a traditional DB plan—namely, having a crossover point that does not occur until very late in a teacher's career.

TECHNICAL MATTERS

Retirement System

Providence Public School District teachers belong to the Employees' Retirement System of Rhode Island, a hybrid plan composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account. A teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her retirement account.

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of hybrid plan

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): 67/any
- Early retirement eligibility requirements for reduced benefits (age/years of service): none

Employer and employee contributions: Defined benefit portion of hybrid plan

- Employee contribution rate: 3.75 percent of salary
- Employer contribution rate: 22.76 percent of salary
- Refundable contributions: employee contributions without interest

Benefit formula: Defined benefit portion of hybrid plan

The DB portion of a new teacher's retirement benefit is equal to the formula below:

Annual benefit = (1.0%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the five highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of hybrid plan

- Vesting requirement: Teachers immediately vest in their own contributions and vest into employer contributions after three years
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account in which they are vested at any time.

Employer and employee contributions: Defined contribution portion of hybrid plan[11]

- Employee contribution rate: 7 percent of salary
- Employer contribution rate: 3 percent of salary

Benefits: Defined contribution portion of hybrid plan

The DC portion of a new teacher's retirement benefit is equal to the balance of her retirement account in which she is vested.

Summary of Plan Provisions

A Providence teacher's hybrid plan benefits consists of two components: (1) a pension benefit (determined by a combination of age, years of service, and final average salary), and (2) the balance of her personal retirement account (her cumulative contributions and the portion of her employer's contributions in which she is vested, plus investment earnings).

Under normal retirement eligibility requirements, a Providence teacher qualifies for full pension benefits at age 67 with any years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.0 percent. A teacher vests into the pension portion after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[12] The plan does not offer reduced pension benefits for early retirement.

The employer contribution rate to the defined benefit portion is 22.76 percent of earnings. The employee contribution rate to the defined benefit portion is 3.75 percent of earnings.

Upon leaving the retirement system, a Providence teacher also receives the balance of her personal retirement account: her own contributions and the portion of her employer's contributions in which she is vested, plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in her own contributions; she vests in her employer's contributions after three years of service.

The employer contribution rate to the defined contribution portion is 3 percent of earnings. The employee contribution rate to the defined contribution portion is set at 7 percent of earnings.[13]

Providence teachers do not pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[14]
- Teacher salary schedule for 2012–13 school year[15]

For DB benefits:

- Survival probabilities from *2007 CDC Life Tables*[16]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC benefits:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[17] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[18]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in the Providence Public School District

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,502	$ 2,502	$ 3,843	-$ 1,341
27	2	$ 0	$ 5,250	$ 5,250	$ 8,062	-$ 2,812
28	3	$ 563	$ 11,816	$ 12,380	$ 12,703	-$ 323
29	4	$ 823	$ 16,603	$ 17,425	$ 17,848	-$ 423
30	5	$ 1,133	$ 21,964	$ 23,096	$ 23,611	-$ 515
31	6	$ 1,580	$ 28,211	$ 29,792	$ 30,327	-$ 536
32	7	$ 2,144	$ 35,085	$ 37,230	$ 37,717	-$ 487
33	8	$ 2,849	$ 42,636	$ 45,485	$ 45,834	-$ 349
34	9	$ 3,709	$ 50,858	$ 54,567	$ 54,673	-$ 105
35	10	$ 4,735	$ 59,764	$ 64,499	$ 64,246	$ 253
36	11	$ 5,890	$ 69,348	$ 75,238	$ 74,549	$ 689
37	12	$ 7,257	$ 79,747	$ 87,004	$ 85,729	$ 1,276
38	13	$ 8,766	$ 90,654	$ 99,420	$ 97,453	$ 1,967
39	14	$ 10,420	$ 102,093	$ 112,513	$ 109,750	$ 2,763
40	15	$ 12,217	$ 114,089	$ 126,307	$ 122,646	$ 3,661
41	16	$ 14,191	$ 126,739	$ 140,930	$ 136,245	$ 4,685
42	17	$ 16,265	$ 140,007	$ 156,272	$ 150,507	$ 5,765
43	18	$ 18,580	$ 153,921	$ 172,501	$ 165,465	$ 7,036
44	19	$ 21,161	$ 168,514	$ 189,676	$ 181,153	$ 8,523
45	20	$ 24,038	$ 183,819	$ 207,857	$ 197,606	$ 10,251
46	21	$ 27,268	$ 199,965	$ 227,234	$ 214,963	$ 12,271
47	22	$ 30,867	$ 216,900	$ 247,766	$ 233,167	$ 14,599
48	23	$ 34,872	$ 234,660	$ 269,531	$ 252,259	$ 17,272
49	24	$ 39,327	$ 253,286	$ 292,613	$ 272,282	$ 20,331
50	25	$ 44,282	$ 272,821	$ 317,103	$ 293,283	$ 23,820

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $23,096 (A+B) and her cumulative contributions are worth $23,611 (C). Her net pension wealth accrued at this point is -$515, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[2] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[3] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] Retirement age depends on years of service; see the "Technical Matters" section for more.

[9] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[10] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[11] Teachers in Rhode Island who are not enrolled in Social Security contribute 7 percent to the DC portion of the plan; the employer contributes 3 percent. This is the scenario we analyze. If enrolled in Social Security, the employee contribution rate is 5 percent and the employer rate is 1 percent.

[12] A teacher who opts for a refund receives the total of her employee contributions to the DB portion of the plan, without interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[13] For employees who do pay into Social Security, the employee contribution rate is 5 percent and the employer rate 1 percent of earnings.

[14] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[15] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[16] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[17] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[18] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

SHELBY COUNTY SCHOOLS (TENNESSEE)

SUMMARY

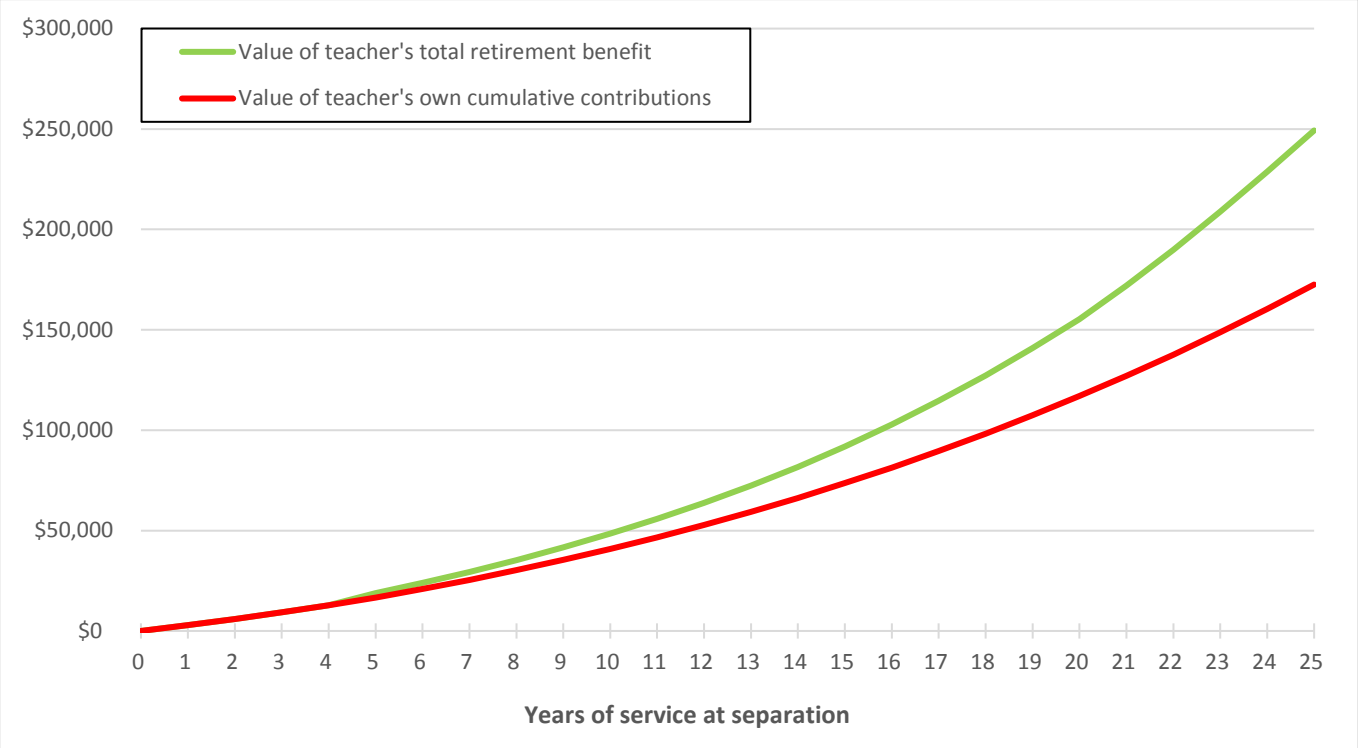
Teachers working in Shelby County Schools belong to the Tennessee Consolidated Retirement System, a hybrid plan composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account.[1] In Shelby County, the crossover point occurs after five years of service, meaning that a teacher must remain in the system five years before her total benefit is worth more than her total cumulative contributions.

About the District	
Students	149,832
Teachers (FTE)	9,282

About the Retirement Plan	
Type	Hybrid
Coverage	Public employees
Active members	135,588
Total members	241,496

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of July, 2011; includes all members in all plans administered by the state system)

Figure 1: A new teacher in Shelby County Schools must remain in the retirement system for five years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher in the Hybrid Plan with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the plan), plus the value of her pension (the DB portion). Where the red line lies directly on top of the green, the value of a teacher's contributions is the same as her total benefit. In other words, her net benefit is zero. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[2] In Shelby County, a new teacher must stay five years to reach the crossover point (where the green line is above the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account: her and her employer's contributions to the DC portion of the plan, plus investment earnings. This portion of her benefit is portable and has no vesting period. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[3] But she is not eligible for any pension benefits until she vests into the DB portion, which is represented in the figure at the point where the green line diverges from the red. Once vested, she still would not start receiving a benefit from the DB portion until she reaches the age of retirement eligibility, even if she leaves the system before that. DB benefits increase in value the longer she stays.[4] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[5] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[6] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[7] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[8] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Shelby County teacher who leaves after **three years** of service (or at any point before the DB vesting point of five years) is only eligible to receive the portion of her retirement benefit from her DC account. Her pension wealth is zero. But even if she separates from the system after only three years, she is still eligible for a benefit worth $9,298, which consists of her and her employer's contributions to her DC account, plus investment earnings. Her net benefit before vesting is zero, because the value of her benefits (at this point from only the DC portion) is equal to the value of her total contributions to both parts of the hybrid.[9]

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each component of her hybrid plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
28	3	$ 0	$ 9,298	$ 9,298	$ 9,298	$ 0
30	5	$ 2,237	$ 16,620	$ 18,857	$ 16,620	$ 2,237
40	15	$ 18,266	$ 73,591	$ 91,856	$ 73,591	$ 18,266
50	25	$ 76,749	$ 172,510	$ 249,260	$ 172,510	$ 76,749

AT THE CROSSOVER

After five years, a Shelby County teacher reaches the crossover point, meaning her total benefit is worth more than cumulative contributions and her net benefit becomes positive. This corresponds to the vesting period of the DB portion of the hybrid plan. After five years, a teacher's total retirement benefit is worth $18,857—the balance of her retirement account ($16,620) plus the value of her pension benefit ($2,237). However, while she is always eligible to receive or transfer her DC benefit, she must wait to receive her DB benefit until she reaches retirement age.[10]

MID-CAREER

After five years (and for the remainder of her career), a Shelby County teacher's net benefit is positive, and equal to the value of her DB benefit because of the way employee and employer contributions are split across the two portions of the hybrid. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[11] Her total retirement benefit is worth $91,856, about 20 percent of which is from the DB portion of the plan and the remainder from the DC portion. Her net benefit is $18,266.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[12] Should a Shelby County teacher stay 25 years, her net benefit is larger than it was mid-career. After 25 years, a Shelby County teacher's total benefit is worth $249,260, with 31 percent of that from the DB portion of the plan.

Bottom Line: A Tennessee teacher who starts at age 25 under the Shelby County Schools salary schedule must wait five years to reach the crossover point. The relatively short time to the crossover point is because of the DC portion of her total benefit. The hybrid plan somewhat dampens a common feature of a traditional DB plan—namely, having a crossover point that does not occur until very late in a teacher's career. And, unlike teachers in a traditional DB plan, if a teacher leaves the Tennessee system before the crossover, at least her net benefit is zero (as opposed to negative).

TECHNICAL MATTERS

Retirement System

Shelby County Schools teachers belong to the Tennessee Consolidated Retirement System, a hybrid plan composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account. A teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her retirement account.

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of hybrid plan

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 65/5 and any/(rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): Lesser of 60/5 and any/(rule of 80)

Employer and employee contributions: Defined benefit portion of hybrid plan

- Employee contribution rate: 5 percent of salary
- Employer contribution rate: actuarially determined
- Refundable contributions: employee contributions plus interest

Benefit formula: Defined benefit portion of hybrid plan

The DB portion of a new teacher's retirement benefit is equal to the formula below:

Annual benefit = (1.0%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the five highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of hybrid plan

- Vesting requirement: Teachers immediately vest in their own and their employer's contributions, plus investment earnings
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions: Defined contribution portion of hybrid plan

- Employee contribution rate: 2 percent of salary[13]
- Employer contribution rate: 5 percent of salary

Benefits: Defined contribution portion of hybrid plan

The DC portion of a new teacher's retirement benefit is equal to the balance of her retirement account.

Summary of Plan Provisions

A Shelby County teacher's hybrid plan benefits two components: (1) a pension benefit (determined by a combination of age, years of service, and final average salary), and (2) the balance of her personal retirement account (her own and her employer's contributions, plus investment earnings).

Under normal retirement eligibility requirements, a Shelby County teacher qualifies for full pension benefits at age 65 with five years of service, or at any age such that the sum of her age and years of service is at least 90, whichever comes first. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.0 percent. A teacher vests into the pension portion after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[14] The plan does offer reduced pension benefits for early retirement, available at age 60 with five years of service, or at any age such that the sum of her age and years of service is at least 80, whichever comes first.

The employer contribution rate to the defined benefit portion is determined by state actuaries. The employee contribution rate to the defined benefit portion is set at 5 percent of earnings.

Upon leaving the retirement system, a Shelby County teacher also receives the balance of her personal retirement account: her own and her employer's contributions, plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in both her and her employer's contributions.

The employer contribution rate to the defined contribution portion is 5 percent of earnings. The employee contribution rate to the defined contribution portion is set at 2 percent of earnings, unless the employee opts out within 30 days of hiring.

Shelby County teachers do pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[15]
- Teacher salary schedule for 2012–13 school year[16]

For DB portion:

- Survival probabilities from *2007 CDC Life Tables*[17]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC portion:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[18] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[19]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in Shelby County Schools

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,892	$ 2,892	$ 2,892	$ 0
27	2	$ 0	$ 5,983	$ 5,983	$ 5,983	$ 0
28	3	$ 0	$ 9,298	$ 9,298	$ 9,298	$ 0
29	4	$ 0	$ 12,841	$ 12,841	$ 12,841	$ 0
30	5	$ 2,237	$ 16,620	$ 18,857	$ 16,620	$ 2,237
31	6	$ 2,999	$ 20,894	$ 23,893	$ 20,894	$ 2,999
32	7	$ 3,909	$ 25,460	$ 29,369	$ 25,460	$ 3,909
33	8	$ 4,972	$ 30,292	$ 35,265	$ 30,292	$ 4,972
34	9	$ 6,220	$ 35,431	$ 41,651	$ 35,431	$ 6,220
35	10	$ 7,661	$ 40,855	$ 48,516	$ 40,855	$ 7,661
36	11	$ 9,221	$ 46,618	$ 55,839	$ 46,618	$ 9,221
37	12	$ 11,018	$ 52,763	$ 63,780	$ 52,763	$ 11,018
38	13	$ 13,099	$ 59,293	$ 72,393	$ 59,293	$ 13,099
39	14	$ 15,489	$ 66,227	$ 81,716	$ 66,227	$ 15,489
40	15	$ 18,266	$ 73,591	$ 91,856	$ 73,591	$ 18,266
41	16	$ 21,445	$ 81,396	$ 102,841	$ 81,396	$ 21,445
42	17	$ 24,994	$ 89,622	$ 114,615	$ 89,622	$ 24,994
43	18	$ 28,957	$ 98,288	$ 127,245	$ 98,288	$ 28,957
44	19	$ 33,406	$ 107,438	$ 140,844	$ 107,438	$ 33,406
45	20	$ 38,268	$ 117,034	$ 155,302	$ 117,034	$ 38,268
46	21	$ 44,923	$ 127,098	$ 172,021	$ 127,098	$ 44,923
47	22	$ 52,218	$ 137,653	$ 189,871	$ 137,653	$ 52,218
48	23	$ 60,083	$ 148,724	$ 208,806	$ 148,724	$ 60,083
49	24	$ 68,334	$ 160,334	$ 228,667	$ 160,334	$ 68,334
50	25	$ 76,749	$ 172,510	$ 249,260	$ 172,510	$ 76,749

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $18,857 (A+B) and her cumulative contributions are worth $16,620 (C). Her net pension wealth accrued at this point is $2,237, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] Depending on date of hire and whether they have previous creditable service, teachers are covered by either the TCRS Hybrid Plan or Legacy Plan. Both are hybrid plans with similar provisions.

[2] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[3] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[4] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[5] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[6] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[7] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[8] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[9] Should a teacher separate from the system before she vests into her DC benefits, she could take a refund of her own contributions to the DC portion of the plan, but she would not see any return on these contributions—what she receives back would be of equal value to what she contributed.

[10] Retirement age depends on years of service; see the "Technical Matters" section for more.

[11] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[12] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[13] Employees can opt out if they file a request within 30 days of being hired.

[14] A teacher who opts for a refund receives the total of her employee contributions, plus interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[15] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[16] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[17] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[18] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[19] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

FAIRFAX COUNTY PUBLIC SCHOOLS (VIRGINIA)

SUMMARY

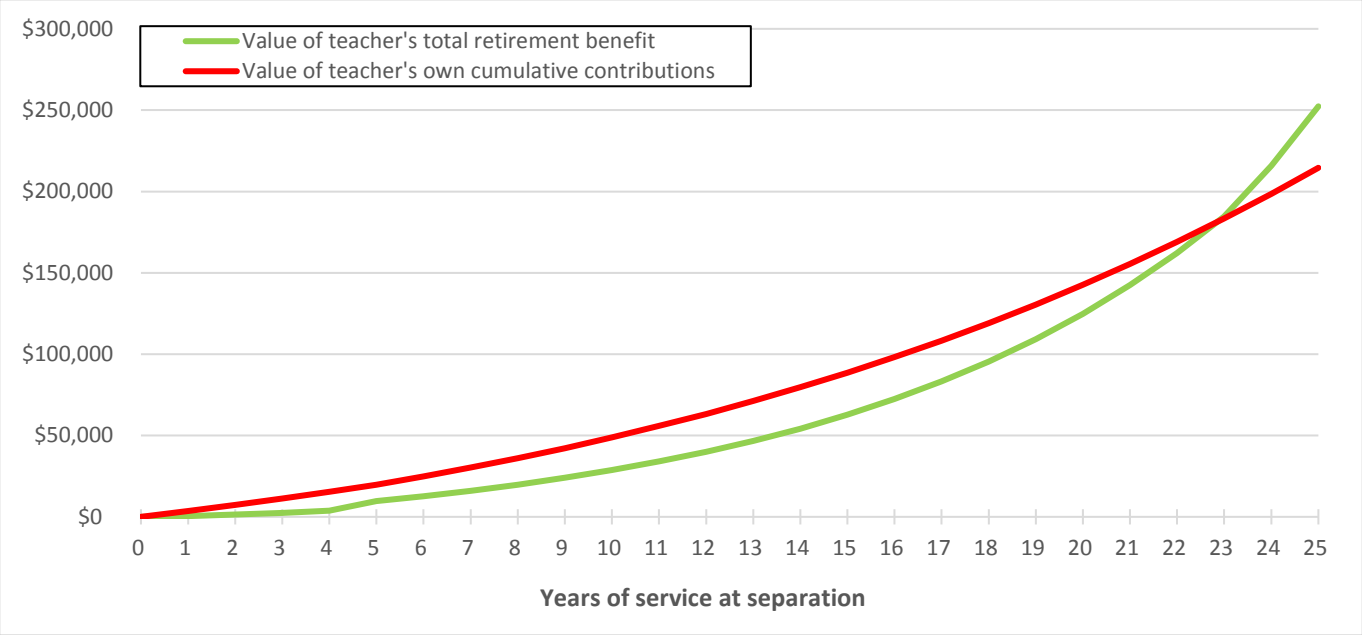
A new teacher working in Fairfax County Public Schools belongs to the Virginia Retirement System (VRS) Hybrid Plan and the Educational Employees' Supplementary Retirement System of Fairfax County (ERFC 2001). The state-sponsored hybrid plan is composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account. The locally sponsored supplemental plan is a traditional defined benefit plan. In Fairfax County, the crossover point occurs after 23 years of service, meaning that a teacher must remain in the system 23 years before her total benefit is worth more than her total cumulative contributions. Because of the parameters of these plans, prior to the crossover point her net benefit is *negative* (whereas it is zero for some of the other hybrid plans in this study). It also takes significantly longer for a Fairfax County teacher to reach the crossover point than it does teachers under the other hybrid plans in this study.

About the District	
Students	183,417
Teachers (FTE)	14,344

About the Retirement Plan[1]	
Type	Hybrid
Coverage	Public employees
Active members	146,690
Total members	217,082

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012; all members in state plan; does not include membership in local supplemental plan)

Figure 1: A new teacher in Fairfax County Public Schools must remain in the retirement system for 23 years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher enrolled in the hybrid plan with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the state plan), plus the value of her pension (the DB portion of the state plan, plus the local DB plan). Where the green line lies below the red, the value of a teacher's total benefit is less than her cumulative contributions. In other words, her net benefit is negative. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[2] In Fairfax County, a new teacher in the hybrid plan must stay 23 years to reach the crossover point (where the green line crosses the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account: her contributions to the DC portion of the state plan and the portion of her employer's contribution in which she is vested, plus investment earnings. This portion of her benefit is portable. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[3] She is not eligible for any pension benefits until she vests into the DB portion of the state plan and the local pension plan. Once vested, she still would not start receiving benefits until she reaches the age of retirement eligibility, even if she leaves the system before that. DB benefits increase in value the longer she stays.[4] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[5] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility, a condition usually determined by some combination of the teacher's age and years of service.[6] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[7] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[8] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Fairfax County teacher who leaves after **three years** of service is only eligible to receive her own contributions to the DC portion of the state-sponsored VRS Hybrid Plan and a percentage of her employer's contribution to that account, plus investment earnings. She has not vested into the DB portion of her benefit from the state plan. She also has not vested into the locally sponsored ERFC plan. Therefore, her total retirement benefit is equal to the value of her retirement account ($2,448). Her net benefit at this point is *negative*, because she has contributed to both portions of the VRS Hybrid Plan and to ERFC. Her cumulative contributions ($11,202) are worth less than her total benefit ($2,448), and her overall net benefit is negative (-$8,754). (In reality, should this teacher separate from the system before she fully vests, she would take a refund of her contributions to ERFC and the DB portion of VRS.)

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
28	3	$ 2,448	$ 0	$ 2,448	$ 11,202	-$ 8,754
40	15	$ 37,391	$ 25,382	$ 62,773	$ 88,654	-$ 25,880
48	23	$ 97,271	$ 87,356	$ 184,627	$ 183,416	$ 1,211
50	25	$ 137,136	$ 115,222	$ 252,358	$ 214,586	$ 37,772

MID-CAREER

A Fairfax County teacher in the hybrid plan must stay four years to fully vest in her employer's contribution to the DC portion of VRS. If she leaves the system with at least five years of service, she will have vested in the DB benefit from both VRS and ERFC and is eligible to start receiving a DB benefit once she reaches retirement age.[9] But even after she vests, her net benefit is still negative—and will stay that way for a long time. Say she separates from the system after 15 years—the average experience of a teacher who leaves the profession.[10] Her total retirement benefit is worth $62,773, a combination of the benefit from both portions of the VRS Hybrid Plan ($37,391) and from ERFC ($25,382). Up to this point, the value of her cumulative contributions to VRS and ERFC is $88,654, and her net benefit still negative (-$25,880).

AT THE CROSSOVER

After 23 years, a Fairfax County teacher finally reaches the crossover point, meaning her total benefit is worth more than cumulative contributions and her net benefit becomes positive. After 23 years, a teacher's total retirement benefit is worth $184,627—her benefit from the DB and DC portions of the VRS Hybrid Plan ($97,271) plus the value of her ERFC pension ($87,356). Her net benefit becomes positive, though small ($1,211).

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[11] Should a Fairfax County teacher stay 25 years, her net benefit ($37,772) is still small. At this point, her total benefit is worth $252,358, with $137,136 from the VRS Hybrid Plan and $115,222 from the ERFC plan. Her cumulative contributions to both plans are worth $214,586.

Bottom Line: A teacher who starts at age 25 under the Fairfax County Public Schools salary schedule must wait 23 years to reach the crossover point. This is significantly longer than the other hybrid plans in this study. Teachers who exit the retirement systems early, or even after a lengthy career, are financially disadvantaged compared to teachers who remain teaching under the same systems much longer—in this case, at least 23 years.

TECHNICAL MATTERS

Retirement System

New Fairfax County Public Schools teachers belong to the Virginia Retirement System (VRS) Hybrid Plan and the Educational Employees' Supplementary Retirement System of Fairfax County (ERFC 2001). The VRS hybrid plan is composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account. A teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her retirement account. ERFC is a traditional defined benefit plan.

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of VRS Hybrid Plan

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 67/5 and any/(Rule of 90)
- Early retirement eligibility requirements for reduced benefits (age/years of service): 60/5

Employer and employee contributions: Defined benefit portion of VRS Hybrid Plan

- Employee contribution rate: 4 percent of salary
- Employer contribution rate: 11.66 percent of salary
- Refundable contributions: employee contributions with interest

Benefit formula: Defined benefit portion of VRS Hybrid Plan

The DB portion of a new teacher's VRS retirement benefit is equal to the formula below:

Annual benefit = (1.0%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the five highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of VRS Hybrid Plan

- Vesting requirement: Teachers immediately vest in their own contributions and vest into employer contributions at the following rate: 50 percent after two years, 75 percent after three years, and 100 percent after four years.
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account in which they are vested at any time.

Employer and employee contributions: Defined contribution portion of VRS Hybrid Plan

- Employee contribution rate: 1 percent of salary
- Employer contribution rate: 1 percent of salary

Benefits: Defined contribution portion of hybrid plan

The DC portion of a new teacher's retirement benefit is equal to the balance of her retirement account in which she is vested.

Eligibility for retirement benefits: ERFC defined benefit plan

- Vesting requirement: Five years
- Normal retirement eligibility requirements (age/years of service): Lesser of 60/5 and any/30
- Early retirement eligibility requirements for reduced benefits (age/years of service): none

Employer and employee contributions: ERFC defined benefit plan

- Employee contribution rate: 3 percent of salary
- Employer contribution rate: actuarially determined
- Refundable contributions: employee contributions with interest

Benefit formula: ERFC defined benefit plan

A new teacher's ERFC retirement benefit is equal to the formula below:

Annual benefit = (0.8%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the three highest years of creditable earnings.

Summary of Plan Provisions

A Fairfax County teacher's hybrid plan benefits consists of three components: (1) a pension benefit from the state-sponsored VRS Hybrid Plan (determined by a combination of age, years of service, and final average salary), (2) the balance of her personal retirement account from the VRS Hybrid Plan (her cumulative contributions and the portion of her employer's contributions in which she is vested, plus investment earnings), and (3) a pension benefit from the locally sponsored ERFC 2001 defined benefit plan.

Under normal retirement eligibility requirements, a Fairfax County teacher qualifies for full VRS pension benefits at age 67 with five years of service, or at any age—as long as the sum of her age and years of service is 90 or more (whichever comes first). The annual benefit from the DB portion of the VRS plan is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.0 percent. A teacher vests into the pension portion of the VRS plan after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement.[12] The plan does offer reduced pension benefits for early retirement, available at age 60 with five years of service.

The employer contribution rate to the defined benefit portion of the VRS plan is 11.66 percent of earnings. The employee contribution rate to the defined benefit portion of the VRS plan is 4 percent of earnings.

Upon leaving the retirement system, a Fairfax County teacher also receives the balance of her personal retirement account in the VRS plan: her own contributions and the portion of her employer's contributions in which she is vested, plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in her own contributions; she vests in her employer's contributions in a stepwise manner (50 percent after two years, 75 percent after three years, and 100 percent after four years).

The employer contribution rate to the defined contribution portion of the VRS plan is 1 percent of earnings. The employee contribution rate to the defined contribution portion of the VRS plan is set at 1 percent of earnings.

Fairfax County also offers a supplemental, locally sponsored DB plan called ERFC. Under normal retirement eligibility requirements, a Fairfax County teacher qualifies for full ERFC pension benefits at age 60 with five years of service or at any age with 30 years of service (whichever comes first). The annual benefit from the ERFC plan is equal to a teacher's years of service, multiplied by her average salary of her final three years, times an accrual factor of 0.8 percent. A teacher vests into the ERFC plan after five years, meaning after five years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement. The ERFC plan does not offer reduced pension benefits for early retirement.

The employer contribution rate to the ERFC plan is actuarially determined. The employee contribution rate to the ERFC plan is 3 percent of earnings.

Fairfax County teachers do pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[13]
- Teacher salary schedule for 2012–13 school year[14]

For DB benefits:

- Survival probabilities from *2007 CDC Life Tables*[15]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC benefits:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[16] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[17]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in Fairfax County Public Schools

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 441	$ 0	$ 441	$ 3,525	-$ 3,084
27	2	$ 1,361	$ 0	$ 1,361	$ 7,264	-$ 5,903
28	3	$ 2,448	$ 0	$ 2,448	$ 11,202	-$ 8,754
29	4	$ 3,832	$ 0	$ 3,832	$ 15,350	-$ 11,518
30	5	$ 6,755	$ 2,899	$ 9,654	$ 19,752	-$ 10,098
31	6	$ 8,644	$ 3,948	$ 12,592	$ 24,869	-$ 12,277
32	7	$ 10,724	$ 5,229	$ 15,953	$ 30,298	-$ 14,345
33	8	$ 13,034	$ 6,780	$ 19,814	$ 36,083	-$ 16,269
34	9	$ 15,608	$ 8,389	$ 23,997	$ 42,251	-$ 18,254
35	10	$ 18,476	$ 10,282	$ 28,758	$ 48,827	-$ 20,069
36	11	$ 21,536	$ 12,488	$ 34,024	$ 55,833	-$ 21,809
37	12	$ 24,924	$ 15,049	$ 39,974	$ 63,293	-$ 23,320
38	13	$ 28,670	$ 18,012	$ 46,682	$ 71,233	-$ 24,550
39	14	$ 32,811	$ 21,435	$ 54,246	$ 79,677	-$ 25,431
40	15	$ 37,391	$ 25,382	$ 62,773	$ 88,654	-$ 25,880
41	16	$ 42,458	$ 29,929	$ 72,388	$ 98,192	-$ 25,804
42	17	$ 48,069	$ 35,160	$ 83,229	$ 108,321	-$ 25,092
43	18	$ 54,286	$ 41,171	$ 95,457	$ 119,074	-$ 23,617
44	19	$ 61,179	$ 48,072	$ 109,252	$ 130,483	-$ 21,231
45	20	$ 68,829	$ 55,989	$ 124,819	$ 142,584	-$ 17,765
46	21	$ 77,325	$ 65,064	$ 142,389	$ 155,414	-$ 13,024
47	22	$ 86,768	$ 75,457	$ 162,225	$ 169,011	-$ 6,786
48	23	$ 97,271	$ 87,356	$ 184,627	$ 183,416	$ 1,211
49	24	$ 115,366	$ 100,582	$ 215,948	$ 198,595	$ 17,353
50	25	$ 137,136	$ 115,222	$ 252,358	$ 214,586	$ 37,772

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $9,654 (A+B) and her cumulative contributions are worth $19,752 (C). Her net pension wealth accrued at this point is -$10,098, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] Teachers hired after January 1, 2014 but not yet vested as of that date enroll in the VRS Hybrid Plan; teachers hired or rehired on or after July 1, 2010 (or hired before that date but not yet vested as of January 1, 2013) are enrolled in VRS Plan 2, a traditional defined benefit plan.

[2] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[3] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[4] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[5] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[6] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[7] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[8] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[9] Retirement age depends on years of service; see the "Technical Matters" section for more.

[10] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[11] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[12] A teacher who opts for a refund receives the total of her employee contributions to the DB portions of the plans, with interest. A teacher who leaves the system prior to vesting can receive a refund only; one who leaves after vesting but before retirement eligibility can choose either a refund or deferred pension benefits.

[13] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[14] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[15] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[16] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[17] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).

SEATTLE PUBLIC SCHOOLS (WASHINGTON)

SUMMARY

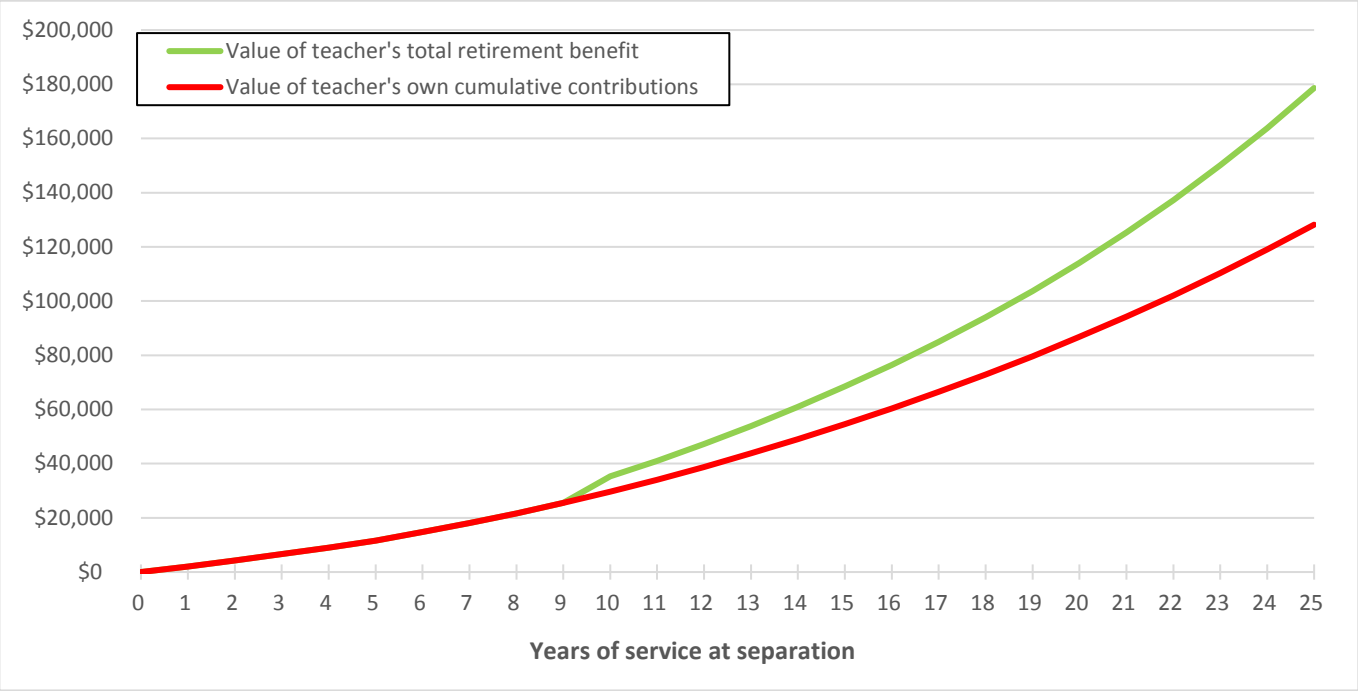
Teachers working in Seattle Public Schools can enroll in Plan 3 of the Washington Teachers' Retirement System, a hybrid plan composed of a traditional defined benefit pension and defined contribution 401(k)-style retirement account. In Seattle, the crossover point occurs after 10 years of service, meaning that a teacher must remain in the system 10 years before her total benefits are worth more than her cumulative contributions. This is also equivalent to the vesting period of the DB portion of the plan. A crossover point corresponding to this vesting point is typical of the hybrid plans in which the teacher contributes only to the defined contribution portion, and the employer to the defined benefit portion, of the plan. (Seattle teachers can also opt for Plan 2, a traditional DB plan only.)

About the District	
Students	50,509
Teachers (FTE)	2,868

About the Retirement Plan	
Type	Hybrid
Coverage	Teachers
Active members	62,463
Total members	76,677

Sources: Enrollment: NCES (2013–14). Retirement plan membership: Urban Institute (membership as of June, 2012)

Figure 1: A new teacher in Seattle Public Schools who opts for the hybrid plan must remain in the retirement system for 10 years before she realizes a return on her contributions



Note: Calculations assume inflation to be 2.5 percent, the real interest rate to be 2.5 percent, return on investments to be 5.0 percent, and a female teacher first hired in FY13 with an entry age of 25.

Take a look at Figure 1. The red line is the value of a teacher's cumulative contributions should she separate from the system after a given number of years of service. The green line is a teacher's total retirement benefit at that point. It is equal to the balance of her retirement account (the DC portion of the plan), plus the value of her pension (the DB portion). Where the red line lies directly on top of the green, the value of a teacher's contributions is the same as her total benefit. In other words, her net benefit is zero. Where the green line is above the red, her total benefit is worth more than her contributions and her net benefit is positive.[1] In Seattle, a new teacher must stay 10 years to reach the crossover point (where the green line is above the red) and receive any return on her contributions after retirement.

The shape of the green line is due to the two components of the hybrid plan. From the day a teacher begins her career, her benefits always include the balance of her retirement account (the DC portion of the hybrid). This portion of her benefit is portable and has no vesting period. Because we use the system's own assumed rate of return on investment, the balance of her retirement account accrues in a fairly smooth and constant manner.[2] But she is not eligible for any pension benefits until she vests, which is represented in the figure at the point where the green line diverges from the red. (Once vested, she would not start receiving pension benefits until she reaches the age of retirement eligibility, even if she leaves the system before that.) DB benefits increase in value the longer she stays.[3] Exact figures can be found in Tables 1 and 2.

Let's take a look at how this plays out should a teacher choose to separate from the system at different points.

WHAT IS THE CROSSOVER POINT?

This study asks: how long must a new teacher wait until the value of her retirement benefits exceeds the value of her contributions (the "**crossover point**")?[4] A new teacher begins contributing a percentage of her salary to her retirement system the day she receives her first paycheck. The idea is that, over her career, she and her employer will make contributions to prefund her benefit and, when she leaves the system, she receives retirement benefits. The total benefit the teacher receives after she leaves depends on the plan's parameters and provisions, among other factors.

In a traditional **defined benefit** (DB) plan, retirement benefits take the form of pension payments made periodically for the rest of her life after retirement. The pension benefit is based on a formula: the number of years of service in the system, multiplied by an average of her final years' salaries, times an accrual factor, which is a percentage generally around 1 percent to 2.5 percent. In order to receive any retirement benefits, a teacher must be vested in the system, meaning she has stayed long enough that she's eligible for a pension when she leaves. Vesting periods generally range from three to 10 years. A teacher can only begin to receive benefits once she reaches retirement eligibility**,** a condition usually determined by some combination of the teacher's age and years of service.[5] The *total* value of the retirement benefit the teacher receives under a DB plan—her **pension wealth**—depends on the yearly benefit, plus her age at retirement and life expectancy.[6] Before the crossover point in a DB plan, a teacher's expected lifetime retirement benefit is worth less than what she contributed over her career. After the crossover point, her benefit is worth more than what she contributed. The longer it takes a new teacher to reach the crossover point, the longer it takes for her to realize any return on her contributions.

In a **defined contribution** (DC) plan, retirement benefits are equal to what the retirement account is worth: her and her employer's contributions, plus any gains (or losses) from investment performance over time. She typically can transfer the balance of her account to another retirement system, withdraw it completely as a lump-sum amount, or draw down balances as periodic payments (less taxes, should she leave early). In a DC plan there is no crossover point, and the value of her benefits will always be greater than her contributions (assuming the investment gained value over time).

A **hybrid plan** combines elements of both DB and DC plans. A teacher's total benefits are equal to the balance of her retirement savings account plus whatever pension benefits she is eligible for. Depending on the specific terms of the plan, there may or may not be a crossover point.

In all three cases, to calculate the crossover point we compare the value of a teacher's contributions with her expected benefits.[7] While the concept of retirement "benefits" implies a positive return on contributions, the analyses presented in this study show that, in order to reach the crossover point and receive a true benefit, new teachers in many of the nation's largest districts must remain in their retirement system for 20 or 30 years—or more. These teachers, usually enrolled in traditional DB plans, are financially penalized if they leave at any point before the crossover. Moreover, they cannot enroll in a different system that would give them larger, or more short-term, benefits. New teachers in DC plans, and most of the hybrid plans we consider, do see a return on their contributions even early in their career.

EARLY CAREER

A Seattle teacher who chooses the hybrid plan and who leaves after **five years** of service (or at any point before the DB vesting point of 10 years) is only eligible to receive the DC portion of her retirement benefit. Her pension wealth is zero. But even if she separates from the system after only five years, she is still eligible for the balance in her retirement account, equal to $11,609, which consists of her contributions plus investment earnings. Her net benefit before vesting is zero, because the total value of her benefits is equal to the value of her cumulative contributions.

Table 1. At key points in a teacher's career, what is the value of her total retirement benefit, and the benefit from each component of her hybrid plan? What is the value of her contributions? And what is the difference between the two?

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
30	5	$ 0	$ 11,609	$ 11,609	$ 11,609	$ 0
35	10	$ 5,670	$ 29,613	$ 35,282	$ 29,613	$ 5,670
40	15	$ 13,904	$ 54,554	$ 68,457	$ 54,554	$ 13,904
50	25	$ 50,436	$ 128,175	$ 178,611	$ 128,175	$ 50,436

AT THE CROSSOVER

After 10 years, a Seattle teacher enrolled in the hybrid plan reaches the crossover point, meaning her total benefit is worth more than her cumulative contributions and her net benefit becomes positive. This corresponds to the vesting period of the DB portion of the hybrid plan. After 10 years, a teacher's total retirement benefit is worth $35,282—the balance of her retirement account ($29,613) plus the value of her pension benefit ($5,670).

After 10 years (and for the remainder of her career), a Seattle teacher in the hybrid plan has a positive net benefit. Her net benefit is also equal to the value of her DB benefit, because her DC benefit is exactly equal to the value of her cumulative contributions. However, while she is always eligible to receive her DC benefit, she must wait to receive her DB benefit until she reaches retirement age.[8]

MID-CAREER

Say a teacher enrolled in the hybrid plan separates from the system after 15 years—the average experience of a teacher who leaves the profession.[9] Her total retirement benefit is worth $68,457, about 20 percent of which is from the DB portion of the plan and the remainder from the DC portion. Her net benefit is $13,904, again equivalent to the benefit from the DB portion.

AFTER 25 YEARS OF SERVICE

A 25-year career is longer than most teachers' careers—fewer than one out of four teachers nationwide stays more than 20 years.[10] Should a Seattle teacher who chose the hybrid plan stay 25 years, her net benefit is much larger than it was mid-career. After 25 years, a Seattle teacher's total benefit is worth $178,611, with 28 percent of that from the DB portion of the plan.

Bottom Line: A Washington teacher in the state's hybrid plan who starts at age 25 under the Seattle Public Schools salary schedule must wait 10 years to reach the crossover point. The relatively short time to the crossover point is

because of the DC portion of her total benefit. The hybrid plan somewhat dampens a common feature of a traditional DB plan—namely, having a crossover point that does not occur until very late in a teacher's career. And, unlike teachers in a traditional DB plan (and even some other hybrids), if a teacher leaves the Washington system before the crossover, at least her net benefit is zero (as opposed to negative).

TECHNICAL MATTERS

Retirement System

Seattle Public Schools teachers can choose to enroll in Plan 3 of the Washington Teachers' Retirement System, a hybrid plan composed of a traditional defined benefit plan and defined contribution 401(k)-style retirement account. Under this plan, a teacher's total retirement benefit consists of a pension benefit payable for the rest of her life and the balance of her retirement account. (Seattle teachers may also opt for Plan 2, a traditional defined benefit pension plan.)

Plan Provisions by the Numbers

Eligibility for retirement benefits: Defined benefit portion of hybrid plan

- Vesting requirement: 10 years (or five years with at least one year of service credit earned after age 44)
- Normal retirement eligibility requirements (age/years of service): 65/10
- Early retirement eligibility requirements for reduced benefits (age/years of service): 55/10

Employer and employee contributions: Defined benefit portion of hybrid plan

- Employee contribution rate: none
- Employer contribution rate: 14.78 percent of salary
- Refundable contributions: n/a

Benefit formula: Defined benefit portion of hybrid plan

The DB portion of a new teacher's retirement benefit is equal to the formula below:

Annual benefit = (1.0%) x (YOS) x (FAS)

Where YOS = number of years of service, FAS = final average salary, the average of the five highest years of creditable earnings.

Eligibility for retirement benefits: Defined contribution portion of hybrid plan

- Vesting requirement: Teachers immediately vest in their own contributions
- Retirement eligibility: no age or years of service requirements. Teachers may withdraw the balance of their retirement account at any time.

Employer and employee contributions: Defined contribution portion of hybrid plan

- Employee contribution rate: 5 percent of salary (default), up to a maximum of 15 percent
- Employer contribution rate: none

Benefits: Defined contribution portion of hybrid plan

The DC portion of a new teacher's retirement benefit is equal to the balance of her retirement account.

Summary of Plan Provisions

A Seattle teacher's hybrid plan benefits consists of two components: (1) a pension benefit (determined by a combination of age, years of service, and final average salary), and (2) the balance of her personal retirement account (her cumulative contributions, plus investment earnings).

Under normal retirement eligibility requirements, a Seattle teacher qualifies for full pension benefits at age 65 with 10 years of service. The annual benefit is equal to a teacher's years of service, multiplied by her average salary of her final five years, times an accrual factor of 1.0 percent. A teacher vests into the pension portion after 10 years, meaning after 10 years of service she qualifies for a pension benefit payable for life, starting at the earliest age that she becomes eligible for normal retirement. The plan does offer reduced pension benefits for early retirement, available at age 55 with 10 years of service.

The employer contribution rate to the defined benefit portion is 14.78 percent of earnings. The employee contribution rate to the defined benefit portion is zero.

Upon leaving the retirement system, a Seattle teacher also receives the balance of her personal retirement account: her own contributions plus investment earnings. There are no age or years of service requirements for retirement. After entering service, a teacher immediately vests in her own contributions.

The employer contribution rate to the defined contribution portion is zero. The employee contribution rate to the defined contribution portion is set at a minimum of 5 percent of earnings.

Seattle teachers do pay into Social Security.

Assumptions for Computing Retirement Benefits

- Entry age: 25 years old
- Gender: female
- Teacher has bachelor's degree for first five years; master's degree for the remainder[11]
- Teacher salary schedule for 2012–13 school year[12]

For DB benefits:

- Survival probabilities from *2007 CDC Life Tables*[13]
- Overall rate of return (defined benefit portion): we use each system's own assumptions for return on investments

For DC benefits:

- Member contributions to retirement savings accounts = minimum (required) amount
- Overall rate of return: 5 percent (2.5 percent inflation, 2.5 percent real interest rate)

Sources: Teacher salary schedule is from district website (or requested directly from the district where required). The salary schedule is supplemented by the district collective bargaining agreement and/or teacher work rules for the 2012–13 school year where applicable/necessary.[14] Retirement plan parameters are primarily taken from a database assembled by the National Council on Teacher Quality, and supplemented where necessary with information from plan documents.[15]

Table 2: Total benefits, contributions, and net benefit for a representative new teacher in Seattle Public Schools who opts for the hybrid plan

Age	Years of Service	Benefits from DB portion (value of teacher's pension benefit) (A)	Benefits from DC portion (teacher's individual retirement account balance) (B)	Value of total retirement benefit (A+B)	Value of teacher's cumulative contributions to date (C)	Net benefit (A+B-C)
25	0	$ 0	$ 0	$ 0	$ 0	$ 0
26	1	$ 0	$ 2,069	$ 2,069	$ 2,069	$ 0
27	2	$ 0	$ 4,260	$ 4,260	$ 4,260	$ 0
28	3	$ 0	$ 6,576	$ 6,576	$ 6,576	$ 0
29	4	$ 0	$ 9,023	$ 9,023	$ 9,023	$ 0
30	5	$ 0	$ 11,609	$ 11,609	$ 11,609	$ 0
31	6	$ 0	$ 14,724	$ 14,724	$ 14,724	$ 0
32	7	$ 0	$ 18,050	$ 18,050	$ 18,050	$ 0
33	8	$ 0	$ 21,629	$ 21,629	$ 21,629	$ 0
34	9	$ 0	$ 25,479	$ 25,479	$ 25,479	$ 0
35	10	$ 5,670	$ 29,613	$ 35,282	$ 29,613	$ 5,670
36	11	$ 6,925	$ 34,045	$ 40,970	$ 34,045	$ 6,925
37	12	$ 8,403	$ 38,791	$ 47,194	$ 38,791	$ 8,403
38	13	$ 10,058	$ 43,783	$ 53,840	$ 43,783	$ 10,058
39	14	$ 11,890	$ 49,032	$ 60,923	$ 49,032	$ 11,890
40	15	$ 13,904	$ 54,554	$ 68,457	$ 54,554	$ 13,904
41	16	$ 16,096	$ 60,360	$ 76,457	$ 60,360	$ 16,096
42	17	$ 18,464	$ 66,467	$ 84,931	$ 66,467	$ 18,464
43	18	$ 21,110	$ 72,890	$ 94,000	$ 72,890	$ 21,110
44	19	$ 24,064	$ 79,645	$ 103,709	$ 79,645	$ 24,064
45	20	$ 27,361	$ 86,749	$ 114,110	$ 86,749	$ 27,361
46	21	$ 31,038	$ 94,221	$ 125,258	$ 94,221	$ 31,038
47	22	$ 35,135	$ 102,078	$ 137,214	$ 102,078	$ 35,135
48	23	$ 39,700	$ 110,343	$ 150,042	$ 110,343	$ 39,700
49	24	$ 44,781	$ 119,034	$ 163,815	$ 119,034	$ 44,781
50	25	$ 50,436	$ 128,175	$ 178,611	$ 128,175	$ 50,436

Pension wealth, contributions, and net pension wealth for a female teacher who begins teaching at age 25. Ex: After her fifth year of service, her pension benefits are worth $11,609 (A+B) and her cumulative contributions are worth $11,609 (C). Her net pension wealth accrued at this point is $0, which is her pension wealth minus her cumulative contributions (A+B-C). All values are adjusted for inflation.

ENDNOTES

[1] "Contributions" here and throughout refer to the value of a teacher's total contributions—the amount she contributes, grown by each system's assumed rate of return.

[2] In reality, investment returns to retirement savings accounts over time will experience both gains and losses, as determined by market performance. To simplify the analysis, we assume a constant and positive rate of return, which equals the system's own assumed rate of return.

[3] Pension benefits typically accrue more rapidly in later years. (See R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211).

[4] Results are based on the retirement plan's rules as they apply to new hires who began in FY13. Provisions for state-covered plans were obtained from the National Council on Teacher Quality pension database (http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22).

[5] A vested teacher who leaves a DB pension plan *before* reaching retirement eligibility faces a choice: She can leave her contributions in the pension fund and wait until she reaches retirement age to receive benefits. Or she can "cash out" and immediately receive a refund of what she has contributed up to that point, sometimes with interest. In rare cases, refunds may also include some or all of the employer contributions, potentially with interest, depending on the terms of the plan and whether the teacher is vested. There are also exceptions where a refund benefit is actually less than what the teacher put in. For instance, Illinois keeps 1 percent of earnings for survivor benefits (see https://trs.illinois.gov/members/pubs/tier2guide/Refunds.pdf).

[6] Pension wealth is the total expected value of a teacher's yearly stream of pension payments over her lifetime, discounted back to the present and accounting for life expectancy, conditional on the age of separation. See *Appendix B*.

[7] The value of a teacher's contribution is the employee's required payment into the retirement system, grown by each system's assumed rate of return.

[8] Retirement age depends on years of service; see the "Technical Matters" section for more.

[9] S. Provasnik and S. Dorfman, *Mobility in the Teacher Workforce* (Washington, D.C.: NCES, 2005), http://nces.ed.gov/pubs2005/2005114.pdf.

[10] NCES, *Digest of Education Statistics*, Table 209.10, http://nces.ed.gov/programs/digest/d14/tables/dt14_209.10.asp.

[11] According to the *Beginning Teacher Longitudinal Study,* 80 percent of beginning teachers had a bachelor's degree. See NCES, *Beginning Teacher Longitudinal Study*, http://nces.ed.gov/surveys/btls/cohort.asp (accessed October 30, 2016. Additionally, given that about 55 percent of the current teaching workforce has a master's degree or higher, but approximately 21 percent of current teachers have five or fewer years of teaching, the analysis assumes that a teacher who remains five years will have a master's degree by that point.

[12] "Professional growth" credits are not included in salary calculations. First, they cannot be applied uniformly across districts: one district may give teachers a salary increase when they earn, for example, 10 credits, while another may specify a salary increase at 20 credits. Second, there are no data available as to the rate at which teachers earn salary credits throughout their career. As others have demonstrated, however, the provisions governing public pension plans will be the primary determinants of benefit accrual patterns (see R. Costrell and M. Podgursky, "Peaks, Cliffs, and Valleys: The Peculiar Incentives in Teacher Retirement Systems and their Consequences for School Staffing," *Education Finance and Policy* 4, no. 2 (2009), 175–211). Variation in a teacher's earnings path, such as that just described, will likely have limited impact on pension wealth accrual patterns or the timing of the crossover point.

[13] E. Arias, "United States Life Tables, 2007," *National Vital Statistics Reports* 59, no. 9 (Hyattsville, MD: National Center for Health Statistics, September 2011).

[14] For example, some districts specify longevity payments in the contract instead of in the salary schedule.

[15] NCTQ, "2015 Pension Flexibility," http://www.nctq.org/statePolicy/2015/nationalFindings.do?policyIssueId=4&masterGoalId=22. Some plan parameters were also independently verified using the Urban Institute's State and Local Employee Pension Plan Database (http://apps.urban.org/features/SLEPP/data.html).