Determinants of Cashing Out: A Behavioral Analysis of Refund Claimants and Annuitants in the Illinois Teachers' Retirement System

Martin F. Lueken

Friedman Foundation for Educational Choice

Michael Podgursky

University of Missouri

Department of Economics

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Abstract

This paper examines pension benefit choices made by public school teachers vested in the Illinois Teachers' Retirement System (TRS) who quit teaching well before retirement eligibility. Teachers who separate have the option of keeping their funds in TRS and collecting a pension at a future date or withdrawing them ("cashing out"). We examine how variation in pension wealth at separation affects this decision, what that reveals about individual discount rates, and how these decisions are affected by teacher characteristics such as race and gender. Results from cash out models suggest higher discount rates among male, African American, and Hispanic teachers; teachers who work in rural districts; and teachers who did not receive a degree from an elite institution in Illinois. Groups who are more likely to cash out are also less likely to roll over their contributions to an IRA or similar tax-advantaged savings vehicles. Since Illinois teachers are not covered by Social Security (as teachers), the latter finding suggests that many exiting teachers may be at risk of inadequate retirement savings.

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1. Introduction

Over 3.3 million K-12 public school teachers nationwide comprise the largest proportion of covered workers in state pension plans, with 88 percent of all teachers enrolled in defined benefit (DB) retirement plans (Snyder & Dillow, 2012; Bureau of Labor Statistics, 2013). These systems impose large capital losses on young and mobile teachers who leave a system before reaching retirement eligibility (Costrell & Podgursky, 2010). Less understood, however, is the extent that teachers cash out of their pension plans even though they may be eligible for a deferred retirement benefit payable for life. Because 92 percent of public pension plans enrolling teachers exclude employer contributions from refund distributions, important questions pertain to the extent that teachers make decisions impacting their retirement security and whether current systems are equitable and fair for teachers.[1] Moreover, the choices directly observed in the data may be indicative of how much teachers value their retirement benefits. That is, the data may reveal teachers' preferences for deferred compensation over up-front compensation and vice-versa.

Researchers have taken a variety of approaches to examine how much teachers value their retirement benefits. Fitzpatrick (2012) exploited a policy change in Illinois that allowed teachers to upgrade their benefits from service accrued prior to 1998 to estimate the value that Illinois public school teachers place on deferred compensation by comparing the cost for this upgrade with teachers' willingness to pay for this enhancement. She estimated that, on average, teachers are willing to pay 19 cents on the dollar for this benefit. Goldhaber and Grout (2014a),

[1] Teachers in Alaska, Colorado, Iowa, Ohio, South Dakota, and Utah may receive some portion of their employer contributions (Doherty, Jacobs, & Lueken, 2015). Colorado, Iowa and South Dakota are the only plans with "final salary" defined benefit plans that credit a portion of employer contributions to refunds. The other three states offer a defined contribution plan, a hybrid plan, or some set of plan choices, and employer contributions in these cases are specifically earmarked for individual retirement accounts associated with the defined contribution portion of the plans.

on the other hand, found that teachers in Washington are generally willing to contribute a higher portion of earnings to the defined contribution portion of the hybrid plan than the minimum level of five percent. Their lower-bound estimate of the average marginal value of one dollar of retirement investment by teachers is over fifty cents, larger than Fitzpatrick's estimate. This paper examines a closely related issue – the discount rates among various groups of teachers. To the best of our knowledge this is the first study to systematically examine discount rates for this important group.

2. Literature Review

Studies on teacher retirement include analysis of the incentives and inefficiencies embedded in traditional DB pension plans (Costrell and Podgursky, 2009), timing of retirement decisions and implications for mobility (Costrell & Podgursky, 2010; Costrell & McGee, 2010; Ni & Podgursky 2011; Koedel et al. 2012; Koedel et al., 2013), projections of retiree health care costs (e.g. Costrell & Maloney, 2013), transition costs (Costrell, Podgursky, & Weller, 2011; Costrell, 2012; Biggs, 2014), plan choice (Chingos and West, 2013; Goldhaber and Grout, 2014b) and relationships between pension benefits and teacher quality (McGee, 2011; Munnell & Fraenkel, 2013; Koedel, Podgursky, & Shi, 2013; Mahler, 2013).

Although the teacher pension literature has expanded significantly over the last decade, few studies have examined benefit choice among teachers. There may be reasons that teachers' retirement behavior differs from other public employees. For instance, teachers purportedly enter the profession primarily for non-pecuniary reasons and therefore may make different choices at separation than other workers. For example, research suggests that teachers are relatively more risk averse (Bowen et al., 2013).

Economic theory predicts that risk-averse teachers without bequest motives will choose to collect an annuity with certainty because of uncertainty about one's lifespan.[2] Converting all or most of one's retirement savings into a lifetime annuity enhances utility because individuals do not have to worry about running out of savings regardless of how long they live. Given the optimization problem of determining the decumulation rate of retirement savings plus the prospect of outliving those savings, it follows that risk-adverse individuals would prefer holding most of their savings in annuitized assets.[3] A wide body of empirical research, however, contradicts this conclusion, giving rise to the so-called "annuity puzzle."

Explanations for the annuity puzzle include risk-sharing within households, existence of bequest motives, excessively high prices for annuities, and adverse selection (Mitchell et al., 1999). Heterogeneous risk preferences offer another explanation for the annuity puzzle, where sorting occurs across public and private sectors along levels of risk aversion (Bellante & Link, 1981; Bonin et al., 2007; Pfeifer, 2011), with larger proportions of retirees choosing pensions over refunds in the public sector. Moreover, findings by Bowen et al. (2013) suggest that prospective teachers display weaker preferences for risk than students pursuing other professions, thereby implying that teachers in particular may have strong preferences for annuities. Heterogeneity in time preferences may also explain observed annuitization patterns. A field experiment in Denmark conducted by Harrison, Lau, and Williams (2002) found that individuals with longer investment in education, higher income, and older age exhibit lower internal discount rates.[4] Finally, variation in financial literacy among individuals may help to explain the puzzle given the role that it plays in retirement planning. The level of financial

[2] (Yaari, 1965). Individuals may prefer to leave all or a portion of their funds to heirs. They cannot do so if they fully annuitize because payments drop to zero when an annuitant dies.
[3] The decision of when to begin retirement poses a highly complex problem as it involves forecasting one's life expectancy, investment outcomes, and health.
[4] This may reflect differential financial market conditions or other factors like discrimination.

literacy is low among Americans nearing retirement, particularly among minorities and individuals with lower education levels (Lusardi & Mitchell, 2006) and young Americans (Lusardi, Mitchell, & Curto, 2010).

Behavioral research suggests that individuals facing alternative choices tend to consider what they already have as a reference point (Kahneman, Knetsch, & Thaler, 1991; Tversky & Kahneman, 1991). If the alternative choice does not provide a benefit at least as generous as what they have, then a person may not choose that option. In the context of teacher public pension plans, a vested teacher in a final average salary (FAS) DB plan who separates before reaching retirement eligibility and therefore faces a choice between a lump sum refund and a deferred annuity may regard the annuity as her reference point. Economic theory predicts that she will choose the benefit at higher value. In order to control for individuals' reference points, researchers calculate the rate that equalizes the values of the choices and include them in their models. A couple of recent studies employ this method in analyzing the determinants of choice among pension plans (e.g. Goldhaber & Grout, 2014b; Yang, 2005). More common research methods rely on surveys to estimate personal discount rates, typically by asking respondents to choose between some amount of money or goods today and a larger amount in the future (Beshears et al., 2013; Finke and Huston, 2013; Klawitter, Anderson, and Gugerty, 2012; DeArmond and Goldhaber, 2010; Brown, Casey, and Mitchell, 2008; Brown, 2001).

There is significant variation in annuitization rates across plans within public and private sectors. Military personnel exhibit much lower annuity rates (Warner & Pleeter, 2001; Cunha & Menichini, 2014). This is surprising because the present discounted values of individuals' annuities in many cases exceeded the values of their lump-sum benefit options. Plans for non-military personnel experience fairly high annuitization rates, ranging from 67 percent to 85

percent (Clark, Morrill, & Vanderweide, 2013; Chalmers & Reuter, 2012). High annuity rates are consistent with expectations because refunds in these plans grant only employee contributions, which render them substantially less valuable than annuities. As in the public sector, substantial variation occurs in annuitization rates overall in the private sector ranging from 27 percent to 88 percent (e.g., Mottola & Utkus, 2007 and Benartzi, Previtero, and Thaler, 2011). After excluding the portion of employees examined in Benartzi, Previtero, and Thaler (2011) who faced an enhanced annuity option, however, the highest observed annuity rate becomes 66 percent. Taken as a whole, studies suggest that workers covered by civilian public pension plans annuitize at higher rates than workers under private plans. The most likely explanation stems from differences in how the values for refund distributions are determined. While refunds must equal the present discounted value of the annuity in the private sector, this is not the case in the public sector, where most public pension plans include only the member's contributions while excluding the employer portion. Thus, refunds are considerably less lucrative in the public sector, which subsequently leads to higher annuity rates.

While only a handful of studies examine distribution choice in public pension plans, none focus solely on teachers. Clark, Morrill, and Vanderweide (2013) examine distribution decisions among all public employees in North Carolina's Teachers' and State Employees Retirement System and Local Governmental Employees' Retirement System. Results from choice models indicate that males exhibit a higher propensity to cash out. They are also more likely to take a cash distribution rather than rolling over their refund. About 32 percent of North Carolina public workers requested a lump sum distribution within one year of separation (higher than the 26 percent rate among our sample of Illinois teachers). About 20 percent of K-12 teachers and other education professionals who vest choose to cash out, much lower than groups from other public

professions such as government, public safety, and health/social service. Notably, nearly 90 percent of all refund claimants opt to receive their refund in cash rather than rolling them over into a retirement account. Only 12 percent of refund claimants roll over their refund into another retirement account.

Warner and Pleeter (2001) exploit the enactment of a military drawdown program to examine annuity decisions by military personnel and estimate individuals' personal discount rates. They find that military personnel display strong preferences for lump sum payments to annuities, even though the present discounted value (PDV) of the annuity substantially exceeded the lump sum amount for most personnel and officers.[5] The authors also found that Blacks were more likely to take a lump sum than other minorities while whites were less likely to cash out than non-black minorities. The level of education, scores on the Armed Forces Qualification Test, and age were inversely related with the take-up decision and time preference. Male enlisted personnel displayed higher discount rates and were more likely to take a lump sum benefit than their female counterparts.

Cunha and Menichini (2014) found similar results as Warner and Pleeter. Estimates for individual discount rates exhibited positive relationships with being male, Black, divorced, number of dependents, and service in the Army or Marine Corps. They were negatively related to age at decision, single status, rank, and education level.

While these studies use variation in benefit choices to explain variation in personal discount rates, several studies have examined the relationship between cash out decisions and retirement security. A handful of studies have examined decisions to roll over lump sum

[5] Despite the fact that the PDV of the annuity more than doubled the lump sum amount (under a 7-percent discount rate), over 90 percent of all enlisted personnel and more than half of all military officers choose the lump sum over an annuity.

disbursements into a retirement savings account (e.g. Poterba, 2005 and Burman, Coe, & Gale, 1999). Poterba and Venti (1998) estimated that one-third of individuals examined in the Current Population Survey rolled over or saved their lump-sum distribution. Of those who did not, the single greatest use of one's distribution was to pay off debt.[6] The authors also find that rollovers are less likely to occur with lower-valued distributions. Burman, Coe, and Gale (1999), using data from the Employee Benefits Survey of the Current Population Survey, estimated that reductions in annual retirement income due to cashouts were about $1,000 to $3,000. None of these studies have examined these issues exclusively among participants in public pension plans.

3. Benefit Distribution Choice in the Illinois TRS

The Illinois Teachers' Retirement System (TRS) is a publicly funded defined benefit plan for public school employees and one of several retirement systems in Illinois that cover state and local public employees. In 2010 Illinois lawmakers enacted Senate Bill 1946, dramatically changing the parameters of its public retirement systems while keeping the FAS DB structure intact. As a result, a two-tier system was created. New employees starting on or after January 1, 2011 enrolled in the new plan (Tier 2) while employees who started before enrolled under the original retirement plan (Tier 1). Our analysis excludes all Tier 2 teachers because we only observe refund claimants among that group.[7]

[6] Poterba and Venti's estimate increases to about almost 60 percent when distributions are weighted by their values.

[7] The vesting requirement for Tier 2 members is 10 years, twice the vesting requirement for Tier 1 members. Tier 2 members have not been in the system long enough to face a decision between cashing out and taking an annuity.

Vested TRS members who separate from service prior to attaining retirement eligibility face a choice to take a refund of their contributions or defer collecting a lifetime pension starting at a later date. This choice is common in public sector FAS DB plans.[8]

For Tier 1 members, a refund withdrawal amounts to 7 percent of creditable earnings earned up to June 30, 1998; 8 percent of creditable earnings earned between June 30, 1998 and June 30, 2005; and 8.4 percent of creditable earnings earned thereafter.[9] Unlike many FAS DB plans in other states, refund claimants under IL TRS do not receive any interest on their contributions. Once a refund claim is processed, a member foregoes any claim to a deferred annuity. Members who do not vest in the system may not collect an annuity at any point later in their life.[10]

Illinois provides an interesting case because, like most states, teachers enroll in a FAS DB plan, and those who opt to receive a lump sum withdrawal (LSW) do not collect the employer's portion of contributions to the pension fund.[11] In addition, Illinois teachers are not in Social Security. Unlike most states, however, teachers collect less than their cumulative contributions. TRS members do not receive contributions earmarked for survivor benefits. Refund claimants forego one percent of their contributions earmarked for survivor benefits. Once

[8] Teachers who do not file for a refund claim leave their contributions in the pension fund and collect an annuity upon reaching retirement eligibility. Teachers must also file a form before they can start collecting an annuity. If they do not file a claim, then they receive nothing until age 70-½, when Federal law pertaining to mandatory disbursements kicks in. Thus, receiving no benefit is the default benefit choice for teachers.

[9] Starting July 1, 2005, refunds for members who do not retire under the Early Retirement Option includes an additional 0.4 percent of creditable earnings, thus boosting the rate on creditable earnings to 8.4 percent.

[10] Members with fewer than five years of creditable service, however, have a choice between two different lump sum disbursements. The first is a conventional refund of their contributions (without interest). Alternatively, she may receive a "Single Sum Retirement" benefit. Under this option, a member may receive a lump sum disbursement actuarially equivalent to an annuity starting at age 65 based on the formula 0.0167x(FAS)x(YOS). About 0.49 percent of TRS members hired since FY 1980 avail themselves of a Single-Sum Retirement benefit.

[11] Teachers contribute 9.4 percent of their earnings while the employer rate (paid by the state) is 35.4 percent for FY 2014. The employer rates for the prior two fiscal years were 24.9 percent and 28.1 percent in FY 2012 and FY 2013, respectively (Teachers Retirement System of the State of Illinois: Contribution Rates, http://trs.illinois.gov/employers/payments/contributions.htm, accessed 4/16/2014).

a teacher cashes out, anyone they designate as a beneficiary becomes ineligible for survivor benefits; yet, refund claimants do not regain the one percent of earnings from their contributions that is designated for survivor benefits.[12]

Finally, while public FAS DB plans like Illinois's vary across states, the general structure and behavior of these plans are very similar. Thus, results from an analysis on one state will likely generalize to a much wider set of systems. Because refund rules in Illinois are less favorable for teachers than any other state, the rate of withdrawals in Illinois plausibly set a lower bound estimate for potential cash out rates in other states.

Figure 1 illustrates the financial tradeoffs that vested teachers face in making refund/annuity decisions and convey the extent to which deferring an annuity is financially favorable or unfavorable relative to cashing out, *ceteris paribus*.[13] It depicts the choice to take a refund or defer an annuity for a representative Tier 1 teacher and depicts the year-over-year cumulative pension wealth (solid line) and lump sum refund (dashed line) patterns for a female teacher in Illinois who enters service at age 25.[14] Initially, this teacher's refund exceeds her expected pension wealth (PW), which is zero until she vests after 5 years of service (YOS). Her

[12] Moreover, a claimant's distribution may be subject to additional taxes or penalties depending on whether they roll over their benefit into a tax-sheltered retirement account. If a member's refund can be rolled over into another retirement account and the claimant elects to take a cash distribution, then TRS will withhold 20 percent of the refund amount, as required by law (TRS, 2013b). Withdrawing before age 59-½ without rolling over her refunds may subject an individual to an additional 10 percent early withdrawal penalty. Thus, refund claimants face potential short-term and long-term costs associated with cashing out: 1) costs associated with early withdrawals, and 2) costs later in life associated with lower levels of retirement savings and foregone accumulation of compounding interest.

[13] We do not claim that these decisions are irrational because we cannot view the life circumstances surrounding teachers' decisions. The extent to which households are cash constrained, expectations about life span, and bequest motives are all likely to weigh on decisions. The key measures used in this analysis offer an interesting and unique way to quantify the tradeoffs that teachers face when making refund/annuity decisions.

[14] The entry age assumption is close to the average entry age of 27 observed among refund claimants and inactive members in the Illinois data. Figure 1 assumes earnings according to the Springfield Public School District's salary schedule, 2.5 percent inflation, 4 percent real rate of return, and survival probabilities from the Center for Disease Control's *Life Tables* (Arias, 2007). This rate is comparable to interest rates assumed in other recent analyses. For instance, Coile and Gruber (2007) assume a 6 percent real rate of return while Koedel, Ni and Podgursky (2014) assume a 4 percent real rate. The median nominal rate assumed by state-based teacher-covered pension plans is 7.75 percent, or 125 basis points higher than the figure's assumption.

net pension wealth (*NetPW*) is negative. At 9 YOS, she reaches a crossover point (marked by the vertical dashed line) where PW surpasses the value of her refund benefit (positive *NetPW*). Because FAS DB plans are "back-loaded," the rate that the gap widens quite rapidly increases until she reaches age eligibility for a pension. This gap exceeds $100,000 in her mid-40's and continues to grow thereafter until PW reaches its peak at age 60, reaching $560,000.

<Figure 1 about here>

After accounting for taxes and penalties associated with non-rollovers and early withdrawal, 35 percent of Illinois classroom teachers identified as refund claimants in the data quit with positive *NetPW*. These teachers exhibit higher discount rates than teachers with similar *NetPW* who choose to collect a pension.

Table 1 presents the distribution of *NetPW* for refund claimants and reports rates based on values of pension wealth adjusted for taxes and early withdrawal penalties. The results provide a sense about the extent that vested teachers separate from service with positive *NetPW*. Zero *NetPW* indicates the crossover point.[15] About 56 percent of refund claimants who separate after the crossover point leave with less than $10,000 in *NetPW* while 24 percent leave with between $10,000 and $20,000 in *NetPW*. Twenty percent of refund claimants separate with *NetPW* that exceeds $20,000. These observations are consistent with the "annuity puzzle" and motivate the analysis at hand.

<Table 1 about here>

[15] The crossover point is sensitive to assumptions about the real rate of return and can have a significant impact on the proportion of teachers observed before and after this point. For instance, the share of teachers who separate after the crossover point is 78 percent under a 2 percent real interest rate and 10 percent by assuming 6 percent interest.

Illinois TRS is one of 16 states-sponsored public pension plans covering teachers that do not enroll its employees in Social Security (Doherty, Jacobs, & Lueken, 2015). Thus, Illinois teachers will not have this "safety net" when they leave service. This could have consequences for the retirement security of some, particularly vested members who choose to take a distribution of their refunds without rolling them over into a retirement savings account. Not only do teachers choosing to cash out forego an annuity (i.e. a lifetime stream of periodic pension payments) and are receiving one percent less than what they contributed, but by not rolling over they also forego potential investment earnings. As we show later, a significant minority of teachers (or two-thirds of refund claimants) do not roll over their distributions. This savings rate is similar to studies that examine rollovers among 401k members (Poterba & Venti, 1998).

4. Methodology and Data

Teachers may make choices about their benefits that differ from their true, unobserved preferences that would be revealed under perfect information. Although teachers receive benefit statements that disclose the value of their refund benefits and monthly pension benefits, statements report refundable contributions as a lump sum amount but pension benefits as a monthly payment. They do not report these benefits in a way that offers an apples-to-apples comparison (e.g. either both benefits as lump sums or both benefits as monthly payments). Nonetheless, complexity and misinformation are likely mitigated as sources of error because members can contact TRS to obtain an estimate of their benefits, and they receive annual benefit statements. TRS also provides its members with information on its web site, including an online benefits calculator. Moreover, discussions about refundable contributions as a benefit (e.g. on

financial statements or in member guides) usually include words of caution stating that refund claims not only terminate all other TRS benefits, but purchasing service credit after re-entering service can be costly.

We estimate individuals' internal rate of return (*IROR*) by developing individual-specific measures that control for the relative attractiveness of plan options and incorporate the highly idiosyncratic and nonlinear incentives embedded in FAS DB plans. This allows comparability between the values of a refund withdrawal and deferred annuity, and we include them in choice models to estimate the impact of individual, professional, school, and district characteristics on the propensity to cash out.

Dependent and key analytic variables

The dependent variable is a binary variable indicating individual teacher's decision to cash out her refundable contributions or leave her contributions in the pension fund. Individual teachers' *IROR* comprises the key independent variable of interest. This measure computes the rate that equalizes the stream of annuity payments with the teacher's lump sum refund, conditional on separation at age *s*. In other words, *IROR* provides the rate that renders the net present value of all cash flows (i.e. both the refund distribution and the stream of annuity payments) to eqaul zero. Thus, *IROR* solves the following equation:

$$-LSW_{is} + \sum_{t=s+1}^{100} \frac{Ben_{it} \cdot Surv(\cdot)}{(1+IROR)^{t-s}} = 0 \qquad (1)$$

where the first term, LSW_{is}, is the value of an individual teacher's lump sum withdrawal conditional on separation at separation age *s*.[16] The second term represents the stream of annuity

[16] We consider cash flows up to age 100. It is important to note that the analysis does not account for the value of retiree health insurance (RHI). Clark, Morrill, and Vanderweide (2013) estimate the present discounted value of RHI

payments a teacher is eligible to receive upon separation, where Ben_{it} is the value of the annuity, collectible at eligibility age conditional on separating at age *s*; and *Surv(·)* denotes conditional survival probabilities.[17]

Computation of *LSW* is straightforward. For a teacher separating at year *t* after *T* years of service, it is simply the sum of products of each year's observed salary ($salary_t$) and the effective refund rate (c_t):

$$LSW_T = \sum_{t=1}^{T}(c_t)(salary_t) \quad (2)$$

A higher *IROR* implies a more desirable annuity. Although an individual teacher's personal discount rate (denoted *PDR*) is unobserved, one may infer a general relationship between teachers' intertemporal tastes and *IROR*. If *PDR* < *IROR*, then she takes the annuity, *ceteris paribus*. If *PDR* > *IROR*, then she will take a lump sum refund.

Teachers who opt for a refund near or at retirement eligibility may experience significant or unusual life events that drive their decision. For instance, various life shocks or emergencies may necessitate immediate cash. Thus, we estimate choice models using samples with age ≤ 50.

Cash Out Model

We estimate the primary cash out model using logit regression. Defining CO_i=1 if teacher *i* takes a lump sum withdrawal and CO_i=0 if she leaves her refundable contributions in the pension fund, we express the cash out model as:

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for employees in North Carolina at between $37,000 and $48,000, depending on age and gender. Including RHI would raise the value of deferred benefits, and the gap between the values of total benefits and refund will likely be substantially larger than *NetPW* alone. Therefore, estimates of the key control variables in this analysis represent a lower-bound.

[17] We assume the stream of future payments grows at 2.5 percent inflation each year. We also include adjustments for cost of living according to the pension plan. Under Tier 1, COLA is 3 percent per year compounded and uncapped.

$$CO_i = \alpha + \beta IROR_i + \rho \boldsymbol{X}_i + \theta \boldsymbol{T}_i + \kappa \boldsymbol{S}_i + \pi \boldsymbol{D}_i + \lambda after2008_i + \varepsilon_i \quad (6)$$

where the vectors $\boldsymbol{X}_i$, $\boldsymbol{T}_i$, $\boldsymbol{S}_i$, and $\boldsymbol{D}_i$, denote individual, professional, school, and district characteristics, respectively, and include gender, race/ethnicity, school level taught, endorsement areas, post-secondary education, and a districts' urbanicity. The last term is a stochastic error term. We also include an indicator for years after FY2008, when the financial crisis occurred, because this economic shock impacted many individuals' retirement accounts in the private sector and subsequently may have affected salaries, job prospects, and retirement decisions for workers in both private and public sectors. On one hand, the recession likely increased the pool of cash-constrained individuals and households and subsequently increased the demand for cash now (and the likelihood for cashing out). On the other hand, the recession may have dampened people's perceptions about financial markets, increased concern about putting money in financial institutions, or changed people's risk preferences. Because an annuity is generally much less risky than cashing out, the recession likely increased annuity demand.

Data

The analysis employs three sources of data: detailed individual-level longitudinal data obtained from the Illinois Teachers' Retirement System (TRS) and the Illinois State Board of Education (ISBE), and enrollment data from the National Center for Education Statistics (NCES). TRS and ISBE each provide unique identification numbers which enable reliable tracking of teachers over time. ISBE staffing records are necessary in order to identify classroom teachers because TRS does not track its members' employment positions. We merge TRS and ISBE data by matching on name, employer (school district), gender, creditable earnings, and years of creditable service.

TRS data include detailed information such as full name, employer (school district), gender, creditable earnings, years of service, member status, hire date and age, separation date and age, types of retirement benefits, final average salary, refund amount, service credit purchases, sick leave, disability claims, extra service credit, and individuals' full earnings histories. Finally, TRS data identifies inactive members who separated from TRS and entered service in a reciprocal Illinois retirement system.[18]

ISBE administrative data includes each teacher's full name, employer, gender, creditable earnings, years of experience, position, type of employment, full-time equivalency, race/ethnicity, post-secondary education degrees, degree-granting institutions within Illinois, and teaching endorsements. NCES data at the district level include total enrollment, urbanicity, free-reduced lunch (FRL) program enrollment, English language learner (ELL) enrollment, Individual Education Plan (IEP) enrollment, and pupil-teacher ratios. We impute missing categorical enrollment data with a simple means imputation method. We also control for college quality where we define elite institutions within Illinois as those ranked in the Top-50 by U.S. News and World Report. Unfortunately, this measure is somewhat noisy because ISBE data do not identify attendance at colleges and universities outside of Illinois.

These data and the analytic setting lend several advantages to an analysis on the determinants of refund-related decisions. First, we directly observe the parameters that TRS uses for determining benefits and important factors that affect retirement decisions and benefits. Thus, we can precisely estimate an individual's pension wealth accrued up to any point in her career while accounting for survival probabilities. Second, while economic theory suggests additional sources of retirement income, such as lifetime payments from Social Security, as an important

[18] TRS classifies a member as "Inactive" if she leaves the system and does not return after one year.

determinant of annuitization decisions, TRS does not contribute to Social Security. Thus, an analysis on retirement decisions by TRS members reduces these potential omitted variable problems.[19] Finally, as no studies to date have systematically examined refund/annuity choices by public school teachers as a standalone group, this paper offers the first systematic examination of cash-out-related decisions by this important group.

This analysis focuses on vested teachers enrolled in TRS who quit service as a full-time teacher and excludes teachers who entered the workforce under Tier 2 because they have not vested yet.[20] Teachers in the Chicago Public School District belong to a separate pension fund, the Chicago Teachers' Pension Fund. We do not observe the complete set of records for Illinois teachers that spent all or part of their time there and exclude them from the analysis as well. We also exclude movers, defined as inactive members who left TRS to continue working in a reciprocal system because data pertains to members' time while working under TRS.[21] Because ISBE staffing data start in FY 1980, the analysis examines teachers hired in or after FY 1980. The sample includes teachers who quit during the period 2002-2011.[22]

Table 2 provides summary statistics of retirement and district-level variables for our analysis sample of refund claimants and annuitants. In the analysis sample we observe 26 percent of teachers choosing to cash out. Refund claimants, on average, accrue $21,314 in PW while annuitants accrue $25,816. The average refund for refund claimants is $6,161 more than the average present discounted value of the annuity they could receive. Relative to annuitants, the

[19] We do not observe households with other sources of retirement income, including spouses with Social Security. For two-person households, retirement decisions are usually made at the household level rather than the individual level.

[20] Teachers not vested do not receive an opportunity to choose a deferred lifetime annuity. TRS offers its non-vested members the option to collect a "Single-Sum Refund," a lump sum disbursement actuarially equivalent to an annuity starting at age 65. This analysis excludes the 0.24 percent of teachers who received this benefit.

[21] Data for teachers who move from a reciprocal system to TRS include service credits earned and reported under their previous plan. Identifying this group of movers is not necessary for the analysis.

[22] Data on FRL enrollment, a widely-used proxy for students' family incomes, is not available prior to 2002.

average refund claimant starts teaching in Illinois 0.58 years older and accrues 0.63 fewer service credits.

<Table 2 about here>

Estimates

Our main cash out models consist of logit regressions on choices of separating teachers. The dependent variable takes the value one if the teacher cashes out and zero otherwise. Consistent with our discussion in the previous section, we expect that *IROR* will exhibit an inverse relationship with the propensity to cash out. An increase in benefits, and therefore increase in pension wealth, make cashing out less desirable than deferring. Higher values of *IROR* are indicative of higher benefits. We also include a variety of control variables for teacher demographics, education, and community characteristics. These may proxy for differences in teacher discount rates and financial literacy. Some research suggests that minorities may face greater borrowing constraints (e.g., Apgar & Calder, 2005), In that case we might observe minority teachers more likely to cash out.

Table 3 displays our model estimates. We report the estimated marginal effects of each variable evaluated at the means of the other covariates. Means for each covariate are reported as well.. All models include IROR and controls for demographics. Moving right, results are presented for specifications that include demographic controls only, indicators for year, indicators for district, and both year and district indicators.

<Table 3 about here>

The coefficients on *IROR* take their expected negative sign and are statistically significant. An increase in the break-even discount rate (the rate that equalizes the lump-sum refund with the present discounted value of the stream of lifetime annuity payments) by one percentage point lowers the propensity to cash out by about three percentage points.

The sizes of coefficients on demographic characteristics across columns are very consistent. Female teachers are about 13 percentage points less likely to cash out than male teachers, holding other covariates constant. This is likely due to men having higher discount rates and falls in line with previous studies finding lower cash out rates among female workers in other settings.[23] Men tend to be dominant earners in two-income households (Winkler & Rose, 2001) and therefore may seek greater control over retirement savings by cashing out. Alternatively, gender differences may reflect variation in risk preferences. Given that women reveal more risk aversion than men with their investment choices (Bajtelsmit, Bernasek, & Jianakoplos, 1999; Gerrans & Clark-Murphy, 2004), female teachers may view an annuity as the safer choice.

Black teachers are about 23 percentage points more likely to cash out than white teachers.[24] Positive coefficients on Hispanic ethnicity suggest that Hispanic teachers are about 10 percentage points more likely than white teachers to cash out. Asian teachers are about 7 percentage points less likely than white teachers to cash out, though these point estimates are noisy.

[23] Clark, Morrill, and Vanderweide (2013), for instance, find that male public employees in North Carolina are about 10 to 12 percent more likely to cash out their contributions.

[24] The higher probability to cash out could also reflect differential credit access and possibly discrimination against minorities (Duca & Rosenthal, 1993). Teachers without access to credit and teachers who face less favorable credit terms will seek capital elsewhere, possibly in retirement savings.

The likelihood of cashing out by teachers who work in rural or town districts is about six percentage points higher than teachers working in a suburban district. This finding may reflect individuals in rural areas having less access to favorable loan terms.[25] The coefficients on city are not statistically significant.

The coefficients for graduate degree are statistically insignificant. The estimates for teachers graduating from an elite university in Illinois, however, are significant and in the expected direction. Teachers who graduated from a top-50 nationally ranked university in Illinois are about nine percentage points less likely to cash out than teachers who did not graduate from an elite Illinois university.[26] This measure is somewhat noisy because the data do not include information about attendance at specific out-of-state institutions (28 percent of the sample). Nonetheless, it does support previous research that largely finds a negative relationship between the likelihood of cashing out and an individual's investment in education. Education may correlate with financial literacy, which plays an important role in retirement planning and behavior (e.g. Lusardi & Mitchell, 2006; Lusardi & Mitchell, 2007). Students at elite colleges in Illinois may be more likely to take classes that boost financial literacy, though this notion is only speculative.[27]

We also account for the recession in 2008 by including a variable that controls for separation from service that occurs during FY 2009 onward. The financial crisis changed

[25] We examined other teacher and district specific variables such type of teacher (high school and special education); subject endorsements; and the makeup of students by race, FRL status, and pupil-teacher ratio. Their coefficients were statistically insignificant.

[26] Illinois universities listed in the Top 50 "National University Rankings" are the University of Chicago, Northwestern University, and the University of Illinois–Urbana-Champaign. Illinois universities with Graduate Education Schools listed in the Top 50 are Northwestern University, the University of Illinois–Urbana-Champaign, and the University of Illinois–Chicago.

[27] Alternatively, students attending these elite institutions may be from high income families and have qualities consistent with lower internal discount rates than students attending non-elite universities. This is unlikely the reason, however, as the majority of elite-institution graduates attended the University of Illinois-Champagne-Urbana, a public university.

financial circumstances for many people and households. It also arguably altered people's attitudes about the financial markets. The sign on the coefficient is negative, though statistically insignificant.[28] We also tested if preferences to cash out changed after the financial crisis by interacting the after-2008 indicator with teacher characteristics. We also interacted teacher characteristics with graduating from an elite institution. We finally estimated models that included a set of district-specific linear trend variables in order to check that results are robust to district-specific shocks over time. For each of these specifications, estimates were very similar to those reported in Table 3.

Table 4 reports predicted probabilities for individual teacher background characteristics. Each probability is conditional on all other covariates evaluated at the means. These show very large differences by demographic groups. The predicted probability of cashing out for male teachers is 39.7 percent. Female teachers are 23.1 percent likely to cash out. The predicted probability for Black and Hispanic teachers is 54.3 percent and 34.7 percent, respectively. Probabilities for white and Asian teachers are lower. The predicted probability for teachers with a degree from an elite Illinois university is 18.5 percent and eight percentage points higher for teachers who did not graduate from an elite Illinois university.

<Table 4 about here>

Finally, teachers who cash out have the option of rolling over their contributions into a tax-sheltered retirement savings account or taking the contributions as a lump sum and paying taxes on them. Teachers who do not roll over their savings may be placing themselves at risk for inadequate retirement savings (e.g. Poterba, 2005 and Butrica, Zedlewski, & Issa, 2010). This

[28] We estimated models with a sample that included all separation ages, and results were very similar. The coefficients on the after-2008 indicator were negative and statistically significant ($p<0.05$).

may be particularly worrisome for Illinois teachers since they are not in Social Security. Data on these choices is presented in Table 5 below. The final column gives the percent of teachers who cash out and do not roll over their contributions. There is wide variation by teacher characteristics. For example, 51 percent of black and 32 percent of Hispanic former teachers cash out and do not roll over savings. This compares to just 18 percent of whites. Teachers over the age of 40 are actually less likely to roll over their withdrawals than teachers under 40.

<Table 5 about here>

Conclusion

This paper analyzed benefit distribution and rollover choices by public school teachers enrolled in the Illinois Teachers' Retirement System (TRS). We estimated behavioral models of the decision to cash out of the pension plan by teachers who separated. Prior research on distribution choice points to an "annuity puzzle." Although theory predicts high rates of annuitization, substantial variation occurs in actual take-up. This puzzle is borne out in the Illinois retirement data, where we observed 26 percent of classroom teachers in our sample choose to take a refund equal to less than the amount they originally contributed to the pension fund.

Results parallel findings in the general retirement literature that examines retirement behavior in different public sector settings. Overall, teachers who are male, Black, Hispanic, have a degree from a non-elite school in Illinois, and who teach in rural areas exhibit higher predicted probabilities for cashing out than their counterparts. The cash out patterns observed in

the data, and the low rates of rolling over refund disbursements, may offer reason for policymakers to be concerned. Minority teachers, teachers in rural areas, and teachers who did not attend an elite college were not only more likely to cash out their contributions, but they were also more likely to not roll over their contributions into a retirement savings account. While we do not observe the reasons for teachers cashing out, these observations could reflect risky behavior without a safety net given that Illinois teachers do not enroll in Social Security.

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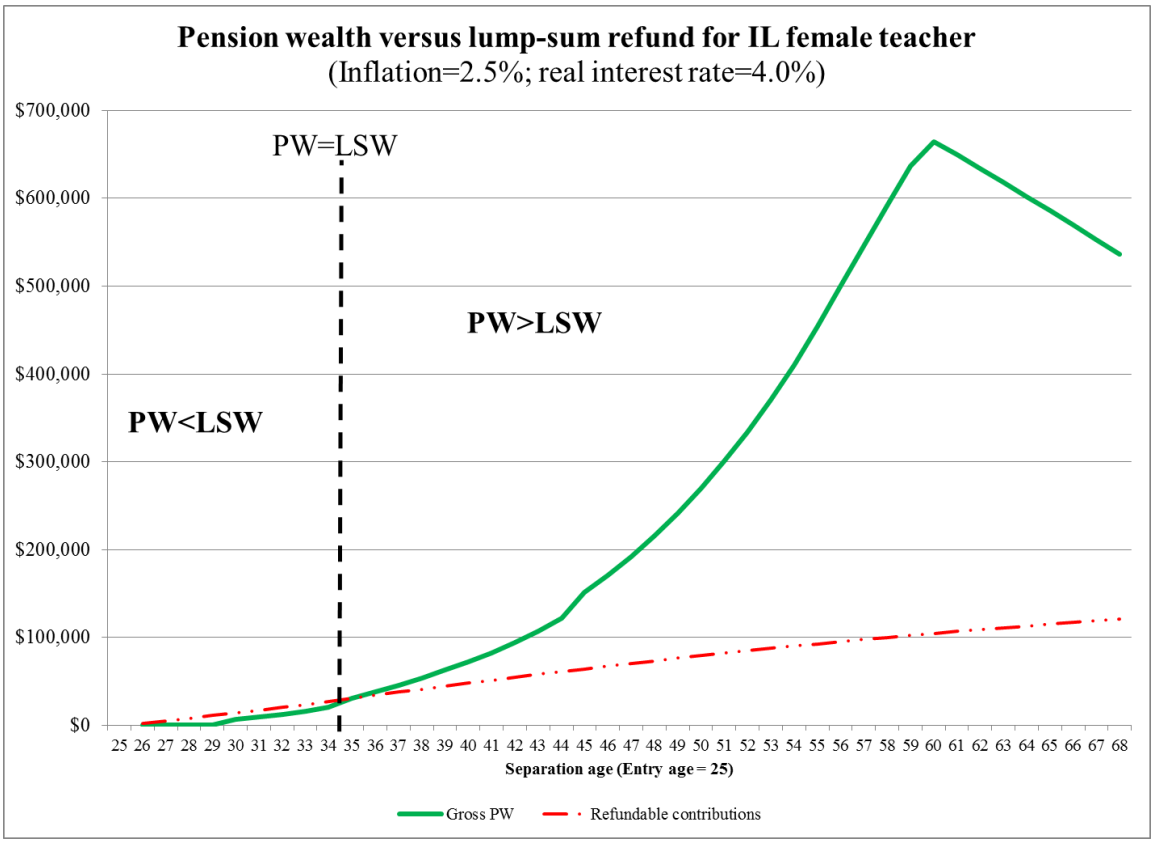
Figure 1: Pension wealth versus lump sum refund for Tier 1 female teacher in ILTRS



Source: Author's calculations based on Tier I rules; the interest rate for refundable contributions is set at zero to reflect TRS rules

Table 1: Distribution of net pension wealth for TRS classroom teacher refund claimants

Net pension wealth	number	percent
Less than $0	1,249	84.0%
$0 to $10,000	134	9.0%
$10,000 to $20,000	57	3.8%
$20,000 to $30,000	23	1.5%
$30,000 to $40,000	11	0.7%
$40,000 to $50,000	6	0.4%
More than $50,000	7	0.5%

Notes: NetPW values are reported in 2011 dollars and based on 4 percent real interest, 2.5 percent inflation, and gender- and race-specific survival probabilities from the CDC's 2007 Life Tables; statistics are based on a sample that includes all classroom teachers hired in or after 1980, separations up to age 50, and individuals who vested in the system; it excludes teachers who left TRS and continued work in another Illinois reciprocal retirement system.

Table 2: Summary statistics for refund claimants and annuitants

	Refund-claimants (n=1,487)		Annuitants (n=4,135)		
	mean	**SD**	**mean**	**SD**	t-test sig
Internal Rate of Return (IROR)	0.030	0.011	0.032	0.012	
Net PW	-6,161	10,436	-4,353	17,061	**
PW at sep'n	21,314	18,378	25,816	26,653	***
Lump sum withdrawal	27,475	12,099	30,169	13,736	***
hire age	25.4	4.7	24.8	4.4	***
separation age	34.1	5.6	34.3	5.4	
YOS	7.6	2.5	8.2	2.9	***
earnings (2011 dollars)	38,997	7,362	39,031	7,594	

The last column indicates the significance of t-test results where *** p<0.01, ** p<0.05, * p<0.1; pension wealth is computed in 2011 dollars and are based on 4 percent real rate of return and 2.5 percent inflation assumptions plus gender- and race-specific survival probabilities from the CDC's 2007 Life Tables; Sample includes TRS members hired in or after 1980 who quit working as a full-time teacher during 2002-2011, who vested in the system, and who never worked in the City of Chicago Public Schools district; sample excludes teachers who left TRS and continued work in another Illinois reciprocal retirement system.

Table 3: Coefficient estimates for cash out models (Marginal Effects)

	Mean	(1)	(2)	(3)	(4)
IROR	0.031	-2.899***	-2.630***	-3.086***	-2.793***
		(0.533)	(0.532)	(0.553)	(0.554)
Female	0.822	-0.133***	-0.133***	-0.134***	-0.134***
		(0.014)	(0.014)	(0.015)	(0.015)
Black	0.022	0.229***	0.234***	0.223***	0.228***
		(0.036)	(0.036)	(0.040)	(0.040)
Hispanic	0.028	0.105***	0.102***	0.094***	0.089**
		(0.034)	(0.034)	(0.036)	(0.036)
Asian	0.015	-0.073	-0.069	-0.069	-0.066
		(0.056)	(0.056)	(0.058)	(0.058)
City	0.140	0.016	0.017	0.010	0.012
		(0.018)	(0.018)	(0.029)	(0.029)
Rural or town	0.271	0.056***	0.057***	0.047**	0.046**
		(0.014)	(0.014)	(0.020)	(0.020)
Graduate Degree	0.120	0.019	0.016	0.022	0.019
		(0.019)	(0.019)	(0.020)	(0.020)
Elite Illinois university	0.092	-0.085***	-0.088***	-0.083***	-0.086***
		(0.023)	(0.023)	(0.024)	(0.024)
After 2008	0.350	-0.017	--	-0.022*	--
		(0.013)		(0.013)	
Observations		5,622	5,622	5,477	5,477
year indicators		NO	YES	NO	YES
district indicators		NO	NO	YES	YES
Pseudo R-squared		0.033	0.038	0.069	0.073
Log Lik		-3140	-3126	-2969	-2955

Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Results are based on logit regressions where dependent variable =1 if cash out, 0 otherwise. These are the marginal effects evaluated at the sample means of all the covariates. Sample comprises TRS members hired in or after 1980 and who quit during the period 2002-2011; sample is restricted to teachers who cash out and annuitants who take a regular pension; sample excludes teachers observed teaching in the City of Chicago PSD and Inactive teachers who moved into a reciprocal Illinois pension system. IROR is computed with survival probabilities for gender and race/ethnicity.

Table 4: Predicted probability of cashing out

Background characteristic:	Predicted probability of cashing out
Female	23.1%
Male	39.7%
Black	54.3%
Hispanic	34.7%
White	25.0%
Asian	17.1%
City district	25.7%
Rural or town district	30.0%
Suburban district	23.8%
Has graduate degree	25.3%
Does not have graduate degree	25.7%
Graduated from elite Illinois college	18.5%
Did not graduate from elite Illinois university	26.5%

NOTE: predicted probabilities are based on logit models that control for IROR; sample computed at the means of all other covariates

Table 5: Distribution of rollovers by teacher characteristics

Background characteristic:	Number	Number of teachers in subgroup cashing out	Percent of subgroup cashing out	Number in subgroup cashing out and not rolling over	Percent of subgroup cashing out and not rolling over
Sample	6,058	1,624	26.8%	1,074	17.7%
Female	4,956	1,179	23.8%	758	15.3%
Male	1,102	445	40.4%	316	28.7%
White	5,075	1,457	28.7%	933	18.4%
Black	138	81	58.7%	70	50.7%
Hispanic	177	69	39.0%	57	32.2%
Asian	84	17	20.2%	14	16.7%
City district	863	231	26.8%	141	16.3%
Rural or town district	1,657	512	30.9%	347	20.9%
Suburban district	3,538	881	24.9%	586	16.6%
Has graduate degree	804	210	26.1%	124	15.4%
Does not have graduate degree	5,254	1,414	26.9%	950	18.1%
Graduated from elite Illinois university	540	103	19.1%	59	10.9%
Did not graduate from elite Illinois university	5,518	1,521	27.6%	1,015	18.4%
Separated age 20-30	1,129	346	30.6%	211	18.7%
Separated age 30-40	3,504	880	25.1%	574	16.4%
Separated age 40-50	989	261	26.4%	199	20.1%
Separated age over 50	436	137	31.4%	90	20.6%

Note: Cash out rates are not regression adjusted and may differ from rates reported in Table 4.