The Reverse Annuity Puzzle: The Choice of Lump Sum Distributions among Separating Public Sector Workers

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Studies examining workers' pension distribution choices have found that the tendency of workers is to select lump-sum distributions instead of life annuities. This choice, which seems to contradict economic theory, has been dubbed the Annuity Puzzle. Previous studies have typically employed survey data based on respondent recall. Using administrative data from the North Carolina retirement system, we illustrate a "reverse" annuity puzzle for public sector workers separating prior to retirement. Even when the present value of cashing out is higher, many separating workers maintain pension accounts. The distribution is larger in present value for three quarters of terminating workers, yet only one third requested cash distributions within one year. We find that among vested separating employees, 33 percent chose to withdraw their funds within one year of separation. Non-vested workers, who only gain from maintaining their account if they return to public sector employment, still only withdrew within one year of separation 36 percent of the time. We explore several potential explanations for this behavior. The evidence suggests separating workers, particularly those with short tenure, may be forgoing important benefits due to lack of knowledge, understanding, or accessibility of benefits.

## I.	Introduction

Each year, millions of American workers leave their jobs either by choice or due to termination by their employers. Many of these job changers participate in defined benefit pension plans. On leaving their employer, these workers are often given a choice of keeping their retirement account open, thus maintaining a claim on a future life annuity, or accepting an immediate lump sum distribution (LSD) of their pension assets.   Workers who accept the LSD are then given a choice of whether they want to roll the funds over into an IRA or to accept the cash as taxable income and also pay a tax penalty for early withdrawal if under age 59.5. These choices can have significant long run implications for future retirement income.

Economic theory argues that consumption smoothing over the lifetime maximizes an individual's utility and that income leveling through the purchase of annuities is one method of achieving this objective (Yaari, 1965). However, a series of national surveys and economic studies have found that individuals rarely purchase annuities in the open market (see, e.g., Mitchell, et al., 1999). Further, when given the choice in their pension plans of a life annuity or a lump sum distribution (LSD), workers typically choose the LSD (see, e.g., Brown, 2001; Engelhardt, 2002; Hurd and Panis, 2006). Thus, workers tend to reject the opportunity to receive a certain flow of income throughout retirement in favor of receiving cash now, which therefore results in individuals assuming the task of managing funds on their own during their retirement years. This conflict between theory and individual choices has been called the "Annuity Puzzle."[1]

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[1] See Benartzi, et al., (2011) for an excellent overview of the 'annuity puzzle' literature.

To test the existence of an Annuity Puzzle among public employees, we first summarize the characteristics of public sector retirement plans compared to those in the private sector and find that the distributional choices that they face are very different. Next, we examine the choices terminated workers make using data from the North Carolina Teachers' and State Employees' Retirement System (TSERS) and the North Carolina Local Governmental Employees' Retirement System (LGERS).[2] As of the end of 2010, these two public pension plans covered 803,636 employees and retired workers. Our unique dataset contains all terminations from state and local government employment in North Carolina between 2007 and 2008 and tracks employee behavior through the end of 2009. The data include relevant economic and demographic information on all individuals who left state or local employment during this time period.

Defined benefit plan participants separating from an employer face a series of choices concerning their pension accounts. Figure 1 illustrates the decisions that terminated workers must make. The first decision is whether to maintain their pension account or accept an immediate LSD.[3] From an economic perspective, a worker should compare the value of the LSD

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[2] While these plans have separate governing boards, they are administered by the same staff and have similar, but not identical, benefits and contributions requirements. Further details of TSERS and LGERS can be found by visiting the retirement systems' home page at: http://www.nctreasurer.com/dsthome/RetirementSystems.

[3] The term "maintain" is used because workers may have the opportunity to request a lump sum distribution at any time after separating from public employment and prior to starting a retirement benefit; thus not accepting the immediate lump sum distribution leaves open the option of requesting such a distribution at some time in the future instead of waiting until one is eligible to start a retirement annuity

to the present value of the life annuity which is set to begin at some point in the future. However, as we will see later, there are a number of factors that make this decision more complicated that a simple wealth comparison.

[Figure 1]

The default is to maintain the pension account; a departing worker must file a request with the retirement system in order to receive an LSD. Depending on the rules of the pension plan, a worker might also have the opportunity to return to work with the same employer and have prior service credits count toward a future retirement benefit.[4] Figure 1 also shows that workers who request an LSD must specify whether they want to receive cash or have the funds rolled over into another approved tax qualified retirement plan such as an IRA. If the worker is sent a check, she could subsequently deposit the funds into an IRA and avoid current taxes and penalties if she follows the IRS guidelines. It is important to remember that individuals preferring to insure against longevity risk by annuitizing have the option of withdrawing funds, rolling over into an IRA, and ultimately purchasing an annuity. Thus, an informed worker should decide whether to withdraw funds based on the highest present value of the distribution options, taking into account predicted inflation and interest rates.

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from the plan. In our analysis, "immediate" means that the terminated worker requested an LSD within one year of termination.

[4] Returning to work and being covered by the same retirement plan is probably much more likely in the public sector where a single plan typically covers all state employees and teachers in the state. This allows workers to change jobs and government agencies and to move within the state while remaining in the same retirement system.

We calculate how the choices made by separating workers are affected by the value of the distributional options available to them. The relative generosity of the two options is estimated using details of the plan characteristics and information provided by the retirement system. Surprisingly, we find that less than one third of all terminating public employees requested an LSD within one year of separation, despite the finding that for over 70 percent of terminations, the LSD was larger than the estimated present value of the annuity. This presents a different kind of annuity puzzle than has been posited in the economics literature: why do so many terminated workers decline an immediate LSD even when the LSD has a greater expected value?

We offer several potential reasons why the distributional choice is more complex than a simple wealth comparison at a point in time. First, separating participants in TSERS qualify for retiree health insurance from the State Health Plan with no premium as long as they are receiving a monthly annuity from TSERS. This option is available for virtually all vested state employees (participants in TSERS), but local employees (participants in LGERS) are not covered by the State Health Plan.[5] We provide evidence that access to retiree health insurance is a relatively valuable benefit. However, we do not see a large difference in the distributional choices between separating workers that will qualify for retiree health insurance and those that will not.

Second, we consider the likelihood that terminated participants plan to return to public employment. The expectation of returning to public employment might make maintaining the

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[5] With a few minor exceptions, workers and retirees covered by LGERS are not covered by the State Health Plan; however, they may be covered by locally-managed health plans that extend coverage to retirees. We do not have the ability to match the local health plans to the LGERS retirement data.

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account the optimal choice for some individuals. However, we document that workers who ultimately returned to work by December 2010 were actually more likely to withdraw funds within one year of separation. Similarly, we highlight that maintaining the account still allows for the option of requesting an LSD at some future date. Because the account balance accrues interest at a guaranteed rate of 4 percent, financially savvy individuals may choose to maintain an account balance and accept a larger LSD at a future date as part of an investment portfolio. Still, we do not see a large difference between the disposition choice of non-vested workers, who do not earn interest, and vested workers. Finally, we address the role that confidence in the retirement system, financial literacy, and inertia may play in the choice to accept an LSD. The default is to leave funds in the system. The behavior we observe is consistent with many individuals accepting the default option and forgoing potentially more valuable benefits.

After this analysis of the choice between an LSD and maintaining one's account balance, we examine the decision between cash and a rollover of pension assets by those who opted for an LSD. The decision on spending versus saving the LSD distribution has received considerable attention by economists; however, only a few studies have been able to observe this choice in administrative records rather than survey data. We find that nearly 90 percent of separating workers that request an LSD elect to receive the funds as cash, rather than rolling over. Of course, individuals who select a cash distribution can still move the funds into a retirement account, pay off debts, or save in nonretirement accounts, rather than spending the money on immediate consumption.

This study finds that separating workers are not responding to the incentives embedded in the pension plan. There is not a sharp change in the proportion of separating workers taking a lump sum distribution by vesting status, nor are workers with a higher present discounted value

of their future annuity less likely to withdraw funds. Approximately thirty percent of workers

withdraw funds, seemingly independent of the relative value of the disposition options. This

Reverse Annuity Puzzle points to a large role for defaults in the disposition choices of separating

workers.

II.   **Comparing Distribution Options in State-Managed Versus Private Sector**

      Defined Benefit Pension Plans

The difference in pension coverage between the public and private sectors of the U.S.

economy is striking. Only 22 percent of full-time private sector workers participate in defined

benefit plans, while 87 percent of full-time public sector workers are enrolled in defined benefit

plans (BLS, 2011a). With 19.2 million individuals working as state and local employees, this

implies that there are approximately 15 million public sector employees participating in defined

benefit plans (BLS 2011b). The difference in coverage highlights the need to focus on public

defined benefit plans, if we are to understand how these plans affect the distributional choices of

terminating workers. Defined benefit plans continue to cover most state and local employees

and virtually all of the plans offer workers the option of an LSD at job separation or retirement

(Clark, Craig, and Sabelhaus, 2011).

    A. Distributional Choices in Private Defined Benefit Plans

Historically, most defined benefit plans provided only annuities to their participants;

however, over time, plan sponsors have increasingly adopted provisions that allow their retirees

the choice of either an LSD or an annuity based on plan provisions. The Bureau of Labor

Statistics (1990) reported that in 1989 only 2 percent of defined benefit plans offered by medium

and large firms gave workers the option of taking an LSD. By 1997, the proportion of these

firms with plans that included an LSD option had risen to 23 percent (BLS, 1999, also see Moore

and Muller, 2002). Data from the National Compensation Survey indicates that 48 percent of workers covered by a defined benefit plan in 2003 and 52 percent in 2007 were in plans that provided employees the option of selecting an LSD instead of accepting the life annuity (BLS 2005, 2007; Purcell 2009). Cash balance plans and other hybrid plans specify the account balance as a lump sum throughout the worker's career. The growth in popularity of these plans may explain some of the increase in the likelihood that a defined benefit plan allows a lump sum option. As more and more pension participants confront the distributional choice in their defined benefit plans, it is increasingly important to understand the determinants of this choice and its implications for retirement income security.

Under federal pension regulations, defined benefit plans in the private sector must offer an annuity and provide participants with information on their future annuities. The lump sum distributions (LSD's) for these plans is required to be calculated as at least equal to the present value of the retirement annuity using approved interest and mortality tables.[6] Things are very different in the public sector. Public sector defined benefits plans usually require explicit employee contributions each pay period, and lump sum distributions are based on the employee contributions and not the present value of the annuity.

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[6] The Pension Protection Act requires that beginning in 2008 the LSD be calculated using a three-segment interest rate yield curve based on the rates of return on investment grade corporate bonds of varying maturities. Purcell (2007) provides additional information on this process and how it affects workers at various ages at termination.

B. Distributional Choices in State-Managed Defined Benefit Plans[7]

In public sector defined benefit plans, the default option for departing workers who are vested is to leave their funds in the pension plan and receive an annuity when they have attained the required age for starting benefits.[8] In plans that offer an LSD, the worker is usually told the value of the distribution that she can receive and her future monthly benefit if she remains in the pension plan. Thus, the departing worker must then determine the present value of the future annuity using her own personal discount rate.

All public defined benefit plans that we have examined offer departing workers the option of leaving their funds in the pension system, thus retaining their eligibility to receive a retirement annuity when they reach the specified age and service requirements of the plan.[9] Most public plans allow separated workers to request an LSD at any point up until the individual starts the retirement annuity. State and local retirement plans are not subject to the Employee Retirement Income Security Act and its subsequent amendments.

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[7] Clark and Hanson (2011) provide a detailed summary of the distribution choices available to teachers and state employees in all 50 states.

[8] Ultimately, the default is that no benefits are paid. Terminated workers who do not request a lump sum distribution are defaulted into keeping their account open. When workers finally satisfy age and service requirements for a benefit, they still must request that their retirement benefits be paid. No request from the terminated worker means no benefit is paid. Data from the North Carolina retirement system show that only in a relatively small number of cases did workers leave public employment and never request either an LSD or the start of an annuity.

[9] Workers who had not yet been employed sufficient years to achieve vesting would have to return to a public job covered by the same pension and work additional years to satisfy the vesting requirements before they would be eligible to receive a future pension benefit.

Private sector defined benefit plans usually do not entail employee contributions.[10] In public retirement plans, on the other hand, employee contributions are typically required.[11] All state retirement plans that require employee contributions for all plan participants offer a LSD option to terminated employees. Separating workers in these plans are offered a lump sum payment at least equal to their own contributions. In some states, individuals are also awarded interest payments on their contributions. The interest rate varies across states and is often a function of years of service. The average interest rate paid on employee contributions among those states with interest payments is 4 percent per year with a standard deviation of 2 percent (Clark and Hanson, 2011). While the empirical analysis of the distributional choices reported in this paper uses administrative records only of North Carolina retirement plans, the choices and plan parameters imbedded in the North Carolina system are similar to those in other retirement plans covering teachers and state employees.

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[10] The Bureau of Labor Statistics (2011a) reports that only 4 percent of workers that are participating in defined benefit plans in the private sector are enrolled in plans that require an employee contribution.

[11] According to Clark and Hanson (2011), only a few state retirement plans do not require workers to contribute a portion of their salary in support of the retirement plan. These plans include Arkansas PERS, Connecticut SERS, Florida FRS, Hawaii ERS, Michigan PSERS and SERS, Missouri MSEP, Tennessee CRS, and Utah SRS. In these noncontributory plans, non-vested terminated workers are not eligible to receive a future retirement annuity nor are they eligible for an LSD. The Bureau of Labor Statistics (2011a) reports that 79 percent of state and local workers that are participating in defined plans are enrolled in plans that require employee contributions with the mean contribution rate being 6.5 percent of earnings.

III.   Previous Literature Examining Lump Sum Distributions

Economists have long been interested in how workers access and utilize the wealth accumulated in their retirement accounts. For the most part, research studies have focused on (1) the choice between an LSD and an annuity at retirement, and (2) the decision by terminating workers who take an LSD to accept a cash distribution or roll over the funds over into another tax qualified retirement plan. Papers on the first topic are often linked to the 'annuity puzzle' and try to explain why economic theory suggests individuals would prefer an annuity but retiring workers largely prefer LSD's. Most studies on the second point use survey data which relies on individuals' ability to recall whether they spent or saved the LSD. There are only a few papers that consider the choice at termination between an LSD and maintaining the account balance and rarely do any studies explicitly examine terminations from public retirement plans. A notable exception is Warner and Pleeter (2001), who estimate participant choices in a military pension plan.[12]

Most studies that have examined the choice of an LSD have focused on respondents in large national data sets (SIPP, HRS). For the most part, these studies have not recognized the difference between workers leaving public sector employment and those in the private sector. Economic theory indicates that workers will compare the cost of purchasing an annuity that is based on population age specific mortality rates and a specified interest rate to their own internal evaluation of the present value of the annuity using their personal preference or discount rate and

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[12] Other papers that examine distributional choices from public plans Chalmers and Reuter (2009) and Butler and Teppa (2007); however, these papers examine the distributional choice at retirement. See Benartzi, Previtero, and Thaler (2011) for a discussion of distributions at retirement.

their own life expectancy. Workers that believe that an annuity based on population life expectancy will be less than actuarially fair to them should accept the LSD (Hurd and Panis, 2006). Individuals with high personal discount rates will place a lower value on the future annuity and thus be more likely to accept the LSD.[13]

Earlier studies have found that when the value of the cash settlement is relatively small, there is a greater likelihood that workers will take the LSD and not roll these funds over into another retirement account, thus rejecting a future life annuity (Hurd and Panis, 2006; Poterba et al, 1998 and 2001; Sabelhaus and Weiner, 1999; and Engelhardt, 2002). Hurd and Panis (2006) observe that women are more likely to request cash settlements than men, as are workers with less formal education. However, others find that men are more likely to take LSD's (Butler and Teppa, 2007; Purcell, 2009). Older workers are also found to be more likely to roll over their pension distributions (Burman, Coe, and Gale, 1999; Moore and Muller, 2002; Warner and Pleeter, 2001). Many of these previous studies address workers' implied discount rates and the effect of high discount rates that minimize the value of the future annuity compared to the LSD.[14]

Despite the impressive list of studies that have examined distributional choices and the use of LSD's, there remain several important shortcomings in these analyses. First, relatively few studies have examined the choices of public sector employees. This is an important gap

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[13] Basically, this choice entails comparing the LSD offered by the plan sponsor that is determined using population mortality data and a specified interest rate to the present value of the future annuity as determined by the individual using their own projection of mortality and their own discount rate.

[14] Other papers that examine the utilization of LSD include Bassett, Fleming, and Rodriguez (1998), Burman, Coe, and Gale (1999), Chang (1996), Copeland (2009), and Yakoboski (1997).

because the distributional options in public sector plans are much different than those in the private sector and defined benefit plans are much more prevalent in the public sector. Second, most prior studies used survey data and depend on the memory of respondents concerning choices that were made years early. The reliance on memory of these events undoubtedly introduces considerable noise. In contrast, this analysis focuses on separations from a public defined benefit using administrative records showing real time decisions.

IV.   **Distributional Choices in the North Carolina Retirement Plans**

Employees who are leaving public employment in North Carolina must decide whether they want to accept a lump sum distribution (LSD) or leave their pension account open in anticipation of a retirement annuity when they have reached the required age for retirement benefits. From an economic perspective, workers should compare the present value of the retirement annuity to their account balance which indicates the LSD that is immediately available to them. The LSD can be known with certainty; however, the present value of the annuity involves a more difficult calculation which should reflect personal discount rates, expected inflation rates, and the likelihood of returning to public employment in North Carolina. In order to understand the choice between accepting an LSD and leaving pension assets in the system, one must consider key parameters of the pension plan and how they affect the value of the lump sum that is available at separation and the annuity expected in the future.

A. **Calculation of the Lump Sum Distribution**

Like most public retirement plans, both retirement systems in North Carolina require employee contributions. Employee contributions are equal to 6 percent of total annual salary and are deducted from paychecks each pay period. These contributions are deposited in the retirement funds of the two state systems and help finance the benefits for retirees. Electronic

records provide a history of worker contributions. In both North Carolina systems, vesting occurs when an employee completes 5 years of service.[15] If workers leave public employment prior to being vested, their LSD is simply the total of their own contributions to the system; i.e., they do not receive any interest credited on these contributions and they do not receive any portion of the employer contributions to the pension fund. Workers leaving public employment after 5 years of service are offered an LSD equal to the total of their own contributions during their employment plus interest credited at 4 percent per year.

Formally, the value of the LSD at the time of separation, LSD_T, is the sum of the contributions in each period (6 percent of the contemporaneous annual salary) compounded at a 4 percent annual interest rate (r). In this formulation, T is equivalent to the years of service at separation. SAL_t refers to the annual salary earned by the employee in time period t. In this example the worker begins her career in time period 0 and separates in time period T.

(1) $LSD_T = \sum_{t=0}^{T-1}[(0.06) * (SAL_t) * (1+r)^{T-t}]$

For simplicity, we assume that salary increases each year at a constant rate, g. Then we can write the salary at time t as a function of the initial hiring salary, SAL_0.

(2) $SAL_t = SAL_0(1+g)^t$

Combining equations (1) and (2) and solving the finite geometric series summation gives the following formula for calculating a worker's LSD at separation time T.

(3) $LSD_T = 0.06 * SAL_0 * (1+r)[(1+r)^T - (1+g)^T]/(r-g)$

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[15] Legislation in 2011 raised the vesting requirement from 5 years of service to 10 years for all newly hired teachers and state employees; however, in the sample we consider, all workers are covered by the 5 year vesting provision.

Notice that the value of the LSD increases with salary level, salary growth, and years of service, but it is independent of gender or age at hire.

Departing employees can learn the value of the LSD by checking their account balances on-line or by directly contacting the retirement system. Thus, the value of the LSD can be known with certainty at the time of separation.

B. Calculation of the Value of the Annuity Benefit

The retirement benefit is calculated in a similar fashion to that typically found in the private sector, using a benefit formula based on years of service and final average salary. Using the estimated benefit for each departing worker, we derive the present value of a future annuity for vested workers in the North Carolina TSERS or LGERS retirement system using the same assumptions employed by the plans to calculate the pension liabilities. The system does not provide an estimate of the present value of the annuity to its members. The present value of the retirement annuity is calculated assuming that the individual will begin receiving an unreduced benefit at age 65.[16]

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[16] Workers with 30 years of service can receive an unreduced benefit at any age; however, in the sample of separated employees that we examine, there are no individuals with 30 years of service. In addition, early retirement benefits are available to employees with 20 years of service at age 50; however, there are substantial reductions for accepting early retirement benefits. The magnitude of the reduction in annual benefits for starting benefits prior to reaching the normal retirement age vary with age and years of service. The benefit reductions for TSERS are presented in the employee handbook page 8, http://www.nctreasurer.com/NR/rdonlyres/223AE566-7BA0-471F-B02C-0A18ABDB97C0/0/NC_TeaState_070111_Final.pdf. System records indicate that only about 25 percent of terminated vested workers wait until age 65 to start benefits; however, the reduction factors imposed by the system for early retirement mean that this assumption does not substantially alter the expected present value of the annuity.

The initial annual benefit that is expected during each year of retirement is calculated using the following formula:

(4) $B_R(T) = M * T * FAS_T$,

where R indexes the age of retirement, T is the number of years of service at separation, and FAS is the final average salary at separation. The pension multiplier, M, is 0.0182 for workers in TSERS and 0.0185 for workers in LGERS. We do not have access to a full earnings history for every separating worker, so we approximate the final average salary used to calculate the annual benefit. In our calculation, we average the last four full calendar years of earnings, while the actual benefit formula uses the average of the highest four consecutive years of earnings (this simplification should have only a minimal impact on the calculation of the FAS).

We calculate the present discounted value of the annuity by multiplying this annual benefit by an annuitization factor and a discounting factor. The annuitization factor, AF_R, is specific to the age of retirement, R. The discounting factor, $D(h,T)$, is a function of age at hire, h, and years of service, T. We write the PDV of the annuity for a worker that separates with T years of service, assuming that benefits are claimed at age R, as:

(5) $PDV\ Annuity_T = B_R(T) * AF_R * D(h,T)$.

The Annuity Factor, AF, is used to determine the value of retirement benefits from age R until time of death, TD. The future annuity stream is adjusted to reflect cost of living increases, inflation, personal discount rates, and age-specific mortality rates according to the following function:

(6) $AF_R = \sum_{s=R}^{TD} \frac{(1+\alpha)^{s-R} Survival_s^R}{(1+r_N)^{s-R}}$,

Historically, retirees have been awarded cost of living increases (COLAs) each year. Over the past decade, the average annual COLA paid to retirees was 1.8 percent each year,[17] so in equation (6) we set α equal to 0.018.[18] The annual benefits are then discounted by the nominal interest rate, our proxy for the individuals' personal discount rate. The nominal interest rate, r_N, is assumed to be equal 5.8 percent, which is the real interest rate, 3.0 percent, plus the assumed inflation rate, 2.8 percent. Finally, $\boldsymbol{Survival_s^R}$ is the age-specific probability of surviving from age R to age s. When making this calculation, we use the age specific mortality rates assumed by the North Carolina State Retirement System.[19]

When deciding whether to accept a lump sum distribution at separation, the worker is interested in the present value of the annuity at the time of job termination. Thus, the present value of the pension annuity at age R must be discounted back to the age of separation. Since final salary is fixed when the individual leaves public employment, the benefit at age R is

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[17] Each year the legislature considers whether to award benefit increases to current retirees. Current law states that benefits can be raised only when the increase does not result in a higher employer contribution. Historically, benefit increases have been awarded almost every year. Between 2000 and 2009, the average annual increase in benefits was 1.8 percent. Given the actual and projected asset losses in 2008, future benefit increases may be less likely and lower for workers separating in the future.

[18] To determine the real value of future benefits back to age 65, one can adopt the inflation assumption used by the Chief Actuary of the U.S. Social Security System of 2.8 percent per year. Thus benefits were increased at approximately 64 percent of the annual rate of inflation.

[19] The analysis does not include any post-retirement death benefits because alternative forms of annuity options available to retirees are calculated to be actuarially equivalent. Thus, the present value of the annuity chosen by a retiree includes any continuation of benefits after the worker's death. In general, the retirement systems do not provide any pre-retirement death benefits; this is in contrast to private sector plans that are required to offer certain pre-retirement death benefits.

determined in nominal dollars. Therefore, the present value at age R is discounted by the nominal interest rate of 5.8 percent.

(7) $D(h, T) = \frac{Survival_R^{T+h}}{(1+r_N)^{R-T-h}}$

Recall h is the age at hire and T is the years of service, so $T+h$ is the age at separation, while R is the age of retirement assumed to be age 65 so that $(R$-T-$h)$ yields the number of years until retirement benefits commence. The term *Survival* indicates the probability of an individual living until time period R given they have survived until time period $T+h$. As above, we set r_N to be 5.8 percent.[20]

We should reiterate that this present value of the annuity described in equation (5) is not used by the plan to calculate the LSD. Instead, this value represents our estimate of the present value of the annuity using the same life tables, along with real and nominal interest rates, used by plan actuaries to evaluate the financial status of the plan. Workers with higher personal discount rates will place a smaller value on the annuity, as will those that believe that they have lower life expectancies. We see from equation (5) that the value of the annuity is increasing in salary level and the rate of salary growth, as well as number of years of service, similar to the LSD. However, the present discounted value (PDV) of the annuity is also an increasing function of age at separation $(T+h)$. In addition, because women's survival probabilities are higher than men's,

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[20] Note that some law enforcement officers are eligible to retire at earlier ages if their primary duties fall into certain categories. We will systematically underestimate the PDV annuity for those workers, but are not able to identify which workers are eligible. Where we do observe job classifications, approximately 10 percent have a position code that could make them eligible for the special benefit.

women's PDV annuity will be (slightly) higher then men's.[21]

C. The Value of Health Insurance in Retirement

A potentially important component of the retirement benefits for public workers in North Carolina is that the state will continue to provide health insurance for retirees in the TSERS system at no premium, provided that they are receiving a retirement annuity.[22] For eligible state employees and teachers, this value of health insurance should be included in the worker's decision whether to take a lump sum distribution.

It is difficult to know how much an individual worker values access to retiree health insurance. In order to calculate the present value of access to the health plan, we start with the claims by age used in the 12/31/2009 valuation as reported in the actuarial statements on Other Post-Employment Benefits (OPEB). The current actuarial analysis of the retiree health plan assumes that the medical care cost rate will increase by 5.0 percent per year after 2015. We increase claims by age by 5.0 percent per year from the time of separation until death. Next, we calculate the present value of coverage in the state health plan at age 65 by discounting the annual value of the health insurance from age 65 to death by the nominal interest rate of 5.8 percent. Since the implied value of health coverage does not vary with salary, this value will be

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[21] One could instead consider the size and terms of an annuity which could be purchased at the time of separation with the funds that are withdrawn. In the private annuity market, insurance companies will use similar interest rates to those we use in our calculations, but may also charge some commission and may adjust for adverse selection (see, e.g., Mitchell, et al., 1999). Because individuals could chose a variety of annuity products, we think framing the discussion in present value dollars using the assumptions adopted by the plan actuaries is a more straightforward comparison.

[22] All states have some form of retiree health insurance for their employees; however, the value of these plans differs markedly across the states, see Clark and Morrill (2010).

the same for all employees at age 65. The present value at age 65 is discounted back to age of termination by the nominal interest rate of 5.8 percent. The value of health insurance is also not related to years of service and so is completely determined by the worker's gender and age at separation.

We should note that the literature on the "annuity puzzle" highlights a potentially important role for health shocks (see, e.g., Brown, 2001). Individuals worried about unanticipated health care expenses may choose to keep assets liquid in order to have funds accessible in the event of a health shock. If a retiree does not have access to employer-provided health insurance, she may worry about the cost of health insurance coverage should an adverse health event occur. Retiree health insurance insures against this type of risk, and thus may be even more valuable to workers than the actuarially equivalent price.[23]

D. Annuity and Lump-Sum Value Simulations

As the above discussion indicates, the value of the LSD is a function of years of service but is independent of age at hire, while the PDV of the annuity is going to be higher for those that are closer to the minimum required age of eligibility for retirement benefits. Thus, as employees accumulate years of service the present value of the annuity will grow relative to the lump sum. Figure 2 illustrates this trend using a hypothetical male worker in the TSERS retirement system with a starting salary of $30,000 who experiences 3 percent wage growth per year. The values are calculated for termination at each age/tenure point shown in the figure. The

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[23] In North Carolina spouses and dependents must pay the full price of the premium, so we do not consider the value of spousal or dependent benefits. There is an implicit subsidy due to risk pooling. Accounting for this would make the "value of health insurance" even larger.

age at which the two lines cross indicates the youngest age of hire at which the present value of the annuity **exceeds** the lump sum amount. Notice that for a separating employee with five years of service, the lump sum value exceeds the present value of the annuity for workers unless they are approximately 40 years or older at hire, while for separating employees with 15 years of service this crossover point occurs at approximately 30 years of age.

[Figure 2]

Figure 2 shows that separating employees with fewer years of service or who are younger when hired are more likely to be facing lump sum values that exceed the present value of the annuity. One might also consider how the "crossing point," where the present value of the annuity overtakes the lump sum amount, varies by age of hire. Table 1 shows the calculated lump sum and present value of annuity amounts for the same hypothetical workers with starting salary of $30,000 per year and annual wage growth of 3 percent. The shaded boxes indicate the option with the larger value for the various age/service combinations. For workers hired at age 25, the crossover point does not occur until after 20 years of service. At the other extreme, a worker hired at age 40 should anticipate an annuity with a present discounted value that exceeds the lump sum by five years of service, when vesting begins.

[Table 1]

These simple comparisons illustrate why it would not be surprising if a substantial proportion of terminated employees select the lump sum option. The LSD will be greater than the present value of the annuity for many departing workers. This is in stark contrast to private sector defined benefit plans which are required by law to price the LSD to be at least equal to the present discounted value of the annuity. However, the final column of Table 1 illustrates the importance of considering the value of health insurance. For the same hypothetical male worker,

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we use the age (at separation) and gender-specific value of health insurance at retirement calculation. Adding the expected present value of health insurance to the cash value of the annuity produces an interesting finding: the value of the (cash plus health insurance) annuity is larger than the LSD for vested terminated workers throughout their career. Table 1 shows that the expected present value of the health insurance in our simulations is approximately $40,000 for all of our hypothetical workers.[24] The value of retiree health is not very sensitive to age at separation due to the assumption that medical care costs are rising faster than inflation so the discounting effect is relatively small. We discuss the value of health insurance further below.

V. Separating Public Employees in North Carolina: 2007 and 2008

The state retirement system maintains records on current employees, separated workers, and retirees consistent with the data needed to calculate and pay retirement benefits to plan participants. The data presented here are from the State of North Carolina's retirement system and contain information on all workers who left public employment during 2007 and 2008.[25] The data include the employee's date of birth, gender, salary, and the retirement plan. In addition, the status of the account is included, which indicates whether the employee is currently receiving retirement benefits, whether the retiree took a lump sum distribution (LSD) and when, or whether the separating worker left the funds in the plan and the account remained "active" (the retirement system refers to these as "dormant" accounts).

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[24] This value reflects the present discounted value of health insurance at the time of separation and accounts for the requirement that retirees have Medicare as a primary carrier when eligible at age 65.

[25] In 2007, the state adopted a new reporting system, ORBIT, that records much more detailed information about the workers' separations. Data from earlier years do not provide sufficient information to analyze economic factors that influence the distributional choice.

Our sample includes workers who terminated employment in 2007 and 2008 and did not retire and begin an annuity within one year of leaving the system. We restrict our attention to separating employees younger than 50 years old in order to more closely approximate a sample that is not eligible to immediately begin a pension, even at reduced level. Our sample includes 11,416 vested and 35,731 non-vested separating employees. Appendix A provides details on the data construction and how specific variables are defined, including vesting status and years of service.

To illustrate the distribution choices made by departing workers, Table 2 reports the number of vested and non-vested workers who left public employment in each year and the percent of the groups which accepted an LSD within one year of separation. In the first column of Table 2, we see that, surprisingly, only about one third of non-vested workers who left the retirement systems requested an LSD within one year of employment termination. This pattern occurs in each of the subgroups based on economic and demographic characteristics shown in the table. These are individuals who, based on service to date, are not eligible for a retirement annuity and who do not receive any interest on the funds left with the system. Though one might have predicted that nearly all non-vested terminated workers would select an LSD, this is clearly not the case. Thus, it is important to attempt to explain why individuals made a choice that, on its face, seems to be financially costly.

[Table 2]

The second column of Table 2 reports a similar breakdown for vested workers. Several similarities are observed in the behavior of vested and non-vested workers. Interestingly, roughly one third of each group, vested and non-vested, accepted the LSD. Women in both groups were significantly less likely to withdraw funds. Older workers in both groups were more

likely to request an LSD and those with more years of service in the non-vested group were also more likely to withdraw their pension funds, perhaps due to having a larger payment. All of the non-vested workers had relatively small account balances. For example, an individual that separates after three years of service whose annual salary was $30,000 would have approximately $5,500 in his retirement account. Hence, there may be a threshold level that provides an incentive for workers to make a positive election for an LSD, while those with only a few thousand dollars in their account may be less inclined to seek an immediate distribution.[26] In contrast, among vested workers, those with the most years of service were the least likely to withdraw, which is not surprising given that the pension system is most generous for longer tenure workers. This is also consistent with findings that private sector workers tend to be less likely to request an LSD the larger the account balance. Vested and non-vested participants in the LGERS were more likely to desire a cash distribution than those in the TSERS system.[27]

There are interesting differences in the desire for an LSD across employment groups. The administrative records sort individuals by broad job classifications. Teachers and other educational professions were much less likely to request an LSD compared to other groups, with

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[26] See Benartzi, et al., 2011, for a discussion of threshold levels from behavioral economics.

[27] This result may be due to the fact that teachers are in the TSERS system and teachers may be more likely to have interrupted careers relative to workers in other occupations and thus be more likely to expect to return to state employment. In addition, workers in TSERS are covered by the state health plan and can receive health insurance in retirement if they ultimately receive a retirement annuity from TSERS. Participants in LGERS are not included in the state health plan and so they may have less incentive to select an annuity option.

only about 20 percent having cashed out their pension accounts. On the other hand, skilled labor and public safety officers are among the most likely to have withdrawn.

For each of the individuals in our data, the exact value of the LSD they could have received at the time of separation is reported. For those that have non-missing salary and gender information, we use the assumptions described above to calculate an estimated present value of the retirement annuity for vested participants. The value of the LSD for each worker is then compared to our estimate of the present value of the pension annuity. The bottom two rows of Table 2 show that of the 8,890 vested terminated workers for whom we have salary data, the LSD exceeds the present value of the annuity for 6,448 (72.5 percent) individuals. Surprisingly, only about one third of individuals in both groups (those where the LSD exceeds the present value of the annuity and those where the LSD is less than the present value of the annuity) requested an LSD within one year of termination. This suggests that the relative value of the two distribution options did not strongly influence the choice made by separating employees.

Figure 3 illustrates the distributions of the lump sum amount minus the present discounted value of the annuity for those that accepted an LSD and those that maintained their account with the retirement system. One might have expected a significant difference in the distributions with lump sum takers having a positive mean and those that maintained their accounts having a negative mean. Instead, the distributions are remarkably similar. This seems to indicate that terminated workers base their distributional choice on factors other than which distributional option had the greatest present value.[28]

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[28] Butler and Teppa (2007) describe a traditional measure of an annuity's value as its Money's Worth Ratio (MWR), which is the ratio of the present discounted value of the annuity payments and the initial

[Figure 3]

VI. Distributional Choices of Vested Workers

A. Empirical Results

We conduct a multivariate regression analysis of the choice to withdraw funds within one year of separation for vested workers. Theoretically, this assumes that the decision to leave is made and then the individual considers what to do with his retirement accounts. Access to funding and the size of account balances may influence the decision to leave government employment; however, we do not model this relationship. Earlier discussion has shown that we should anticipate differences in distributional choices based on certain personal and plan characteristics for two reasons. First, as simulations demonstrate, the relative values of the distribution options are a function of the workers' age at hire, years of service, gender, and salary. Given differences in the two pension plans, one might also anticipate that distributional decisions will vary by participation in TSERS or LGERS. Second, previous research has shown that the choice to annuitize, holding constant the relative generosity of the distribution options, varies by gender, age, and the size of the pension account.

In a simple reduced form regression, it is not possible to isolate whether the choice to withdraw funds is due to underlying demographic characteristics affecting desire to annuitize or plan parameters affecting the relative generosity of the distribution options. We attempt to measure these two avenues by including both demographic controls (to the extent available in the data), as well as the size of the LSD and our approximation of the present discounted value of the

cost. The MWR is then determined to be equal to one if the annuity is well-priced, with the difference usually attributed to adverse selection and administrative costs. In our formulation, the PDV annuity equal to the LSD would be theoretically similar to a MWR of one.

annuity.   Not only are some of the variables closely related, but the size of the LSD and present value of the annuity are functions of age, salary, and years of service. The annual retirement benefit is exactly determined by annual salary and years of service, and the present value of this benefit is based on the assumed interest rate and age of the employee at termination. Thus, one should be concerned about the inclusion of age, years of service, salary, the value of the LSD and the present value of the annuity in the same specification. However, it is also likely that variables such as age and salary may have independent effects on the distributional choice. Thus, we expect that the estimated coefficients would be sensitive to the inclusion of all of these variables in the same regression.

   With these caveats in mind, Table 3 presents coefficients from a regression on the choice of whether to withdraw funds within one year of separation among workers who were vested in the retirement plan for whom we have salary information.[29] We estimate the withdrawal decision as a function of the worker's age, gender, years of service, final average salary, state or local retirement plan (TSERS versus LGERS), the account balance at termination, the present value of the annuity, a dichotomous variable indicating whether the LSD was greater than the present value of the annuity, and finally, the year of termination. The results of seven alternative specifications are shown in Table 3. The regression specifications allow us to observe the effect of including or excluding certain key variables which are collinear or highly correlated with each other. A key finding is that most of the coefficients are not sensitive to specification and are

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[29] The annuity values cannot be calculated without data on salary and gender. Appendix Table A2 provides a parallel set of results for the full sample of separating workers but not including any salary information. Overall the findings are similar, although the coefficient on separated in 2008 (relative to 2007) is not significant, while the years of service coefficient is positive and significant.

relatively stable across specifications. The exception is the effect on the estimated coefficients

on the account balance and years of service when both are included (columns 2, 3, 4) versus

when one is deleted from the equation (columns 1, 6, 7).

[Table 3]

The estimates indicate that workers separating in 2008 were about 4 percentage points

more likely to request an LSD than those who terminated in 2007. This may be due to the

economic downturn and the greater need for liquidity. Terminated workers in TSERS were

approximately 9 percentage points less likely to request an LSD compared to comparable

workers leaving LGERS. Men were 10 percentage points more likely to request the LSD. The

effect of age is nonlinear with younger workers being more likely to choose an LSD. Depending

on the specification, the effect of age on the probability of receiving an LSD is positive but

declining up until the worker reaches age 30 to 45 after which age has a negative effect on

accepting an LSD. The effect of higher average salary also has a nonlinear effect on the

distributional choice. The effect is negative up until a salary of over $100,000 (depending on the

specification) and for higher salaries becomes positive. Surprisingly, increases in the present

value of the annuity have a linear relationship, suggesting that an additional $10,000 in present

value is associated with a 10 percentage point higher probability of accepting an LSD.

We compare columns 2 and 3 to columns 6 and 7 to illustrate the effect of including or

excluding the years of service variable. When included, additional years of service have a

negative effect on the likelihood of accepting an LSD, with the relationship becoming more

negative as years of service increases. In these regressions, having a higher account balance

increases the likelihood of accepting an LSD as long as the balance is less than $50,000

(depending on specification) and then greater account balances reduce the probability of

accepting an LSD. When years of service is omitted from the specification, the impact of a larger account balance is reversed.

In general, these finding on gender, year of separation, age, annual salary and being in TSERS conform to expectations. However, there is one puzzling result, although this finding is consistent with the means in Table 2. The specification in column 4 includes a dichotomous variable indicating whether the account balance was greater than the present value of the annuity. The expectation was that, for terminated workers whose LSD value exceeds the present value of a future annuity, these workers would have had a greater likelihood of accepting the LSD. The estimated coefficient on this variable is negative and insignificant. Although this variable is clearly measured with a substantial amount of error, it is still surprising that our (albeit noisy) measure of relative size has no impact on distribution choice. Even when controlling for important personal and plan characteristics, it seems departing vested workers are not making their distributional decisions based on the relative values of their two options.

B. Reasons the relative size of the two options would not influence the distributional choice

We postulate five hypotheses on why the relative size of the LSD and the present value of the annuity might not affect the distributional choice in the manner initially expected: (1) the potential of subsidized health insurance in retirement if one selects an annuity, (2) the likelihood of returning to work and continuing to build years of service, (3) the option value of keeping the account open and earning a 4 percent return until the option is executed, (4) uncertainty regarding the future benefit and attitudes towards risk, and (5) inertia, inadequate financial literacy, and the lack of knowledge about the choices and their relative value. We now consider each of these relationships and their potential effect on the distributional choices of terminated

vested workers. A discussion of how these factors might influence non-vested workers follows in Section VII.

The calculation of the present value of the annuity makes a series of assumptions including a personal discount rate and a life expectancy from an actuarial life table. In addition, we are assuming that individuals are risk neutral. In this context, risk neutrality is a benign assumption, since technically a worker could withdraw funds and immediately roll them over into another tax qualified account. Because workers that request an LSD have the option of rolling funds over into another tax qualified account without paying a penalty, or may withdraw funds but still save for retirement using other means, attitudes towards risk cannot explain choices in this context. An individual that has a higher personal discount rate or a lower life expectancy would value the annuity less than our calculation and would be more likely to take a lump sum. Similarly, separating workers that have a bequest motive would be more likely to withdraw funds. These and other personal characteristics have been proposed in the literature to explain the annuity puzzle[30] that people do not purchase annuities, but do little to explain our reverse puzzle.

Access to Subsidized Health Insurance in Retirement. The present value of the retirement annuity in the regression analysis was based solely on the cash benefit one could expect to receive in retirement. However, vested employees in the TSERS (teachers and state government workers) system who leave their pension account open and ultimately receive a

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[30] Brown (2001) discusses the annuity puzzle in detail, surveys the empirical work on this issue, and develops a concept of annuity equivalent wealth variable to partially explain decisions to annuitize wealth in defined contribution retirement plans.

retirement benefit are also eligible to participate in the state health plan once they begin

receiving the pension. The state will pay 100 percent of the health insurance premium for these

former employees.[31] Persons who accepted the lump sum are not eligible for participation in the

state health plan in the future.

In Section V, we demonstrated an approximate calculation of the present discounted

value of health insurance beginning when the retirement annuity starts and ending with death.

Table 1 demonstrated that health insurance is a relatively valuable benefit, and those who

anticipate taking advantage of this benefit would see the present value of the annuity plus the

present value of the health insurance exceed the LSD amount. To give a sense of the magnitude

of the health insurance benefit relative to the annuity in the data, we estimate that the present

discounted value of health insurance is between $37,225 and $47,854 depending on the

individuals' age at separation and gender. We find that all but one separating worker have a

smaller LSD when compared to the combined value of the PDV of the annuity and health

insurance benefit. For this group, it is therefore much less surprising that only 29 percent choose

to withdraw funds within one year of separation.

Thus, including the value of retiree health insurance fundamentally alters the puzzle

concerning distributional choices. Now we must ask why one third of the workers that would

qualify for RHI did take the LSD. For virtually all of them, the annuity with retiree health

insurance would provide greater lifetime value in dollars. Furthermore, to the extent that RHI

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[31] In 2011, the North Carolina General Assembly passed legislation that for the first time required a premium to be paid by active and retired workers for the Standard Plan offered by the state; however, workers and retirees still had access to the Basic Plan without having to pay a premium (Clark and Morrill, 2011).

insures against unexpected health care expenses, we might expect individuals to value the insurance at an even higher rate than simply the cost to the employer.

Of course, this assessment of the relative value of the distributional options assumes that the departing worker believes that the benefit will still be provided by the time she retires and that she intends to claim the health insurance benefit. The cost and liabilities associated with state retiree health plans have been critically examined since new reporting standards were required by the Governmental Accounting Standards Board (Pew Center on the States, 2011; Clark and Morrill, 2010). The unfunded liabilities have been widely reported in the popular press, and many states (including North Carolina) have been modifying the terms of these plans. Thus, it would not be surprising if public employees doubted whether the currently promised benefits will be available in 10 or 20 years. Reflecting this concern, terminated workers may further discount the value of future health insurance in retirement provided by the state. Further, some workers may have access to health insurance through spousal coverage, so do not value this benefit.

Potential for Returning to Work and the Distributional Choice. If terminated workers anticipate that they may return to public employment in North Carolina, they may wish to keep their accounts open. Terminated workers who return to public employment will maintain the years of service based on their previous employment provided they kept their accounts open and did not receive an LSD. Thus, an employee who temporarily left their job due to medical or family reasons with the intention of returning to public employment within a few years may find it convenient and cost effective to leave her account open. Workers who accepted an LSD can purchase their prior years of service at a price specified by the plan.

Table 4 provides a short term analysis of this issue for all workers who left the retirement systems in 2007 and 2008 and indicates whether they returned to public employment by the end of 2009. Surprisingly, a greater proportion of those who returned to public employment had accepted an LSD. Among those that returned to employment during this period 44 percent of the vested workers and 49 percent of the nonvested terminations had selected an LSD. In contrast, only about one third of both vested and nonvested employees who had not returned to public employment chose an LSD. It should be emphasized that our time period for return to work is only one to two years and the impact could be substantially different if we had data over a longer time period.

[Table 4]

Option Value of Maintaining a Pension Account. A terminated worker can request an LSD at any time after leaving public employment up until he actually starts a retirement annuity. For vested individuals, the account balance continues to increase each year by a plan specified interest rate of 4 percent. Thus, well informed individuals could view this as an investment option. The individual could request an LSD and invest the money themselves or leave the money with the state plans and earn a guaranteed return of 4 percent. Given the uncertainty in the financial markets during this period, a guaranteed return of 4 percent may have been an attractive investment. Data provided by the retirement system suggests that most LSD's occur relatively close to the date of termination.[32] A longer time series of data on when terminated workers request an LSD would provide better insight into this issue.[33]

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[32] In 2010, 12,501 terminated workers took an LSD. Of these 8,473 individuals received the distribution within one year of termination, another 1,234 had been gone for between one and two years, and another

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Confidence in the Retirement System. Over the past few years, the popular press has included many front page stories about the financial problems facing public pension plans, including the rising cost of providing these benefits and low funding ratios. North Carolina has one of the best funded public pension plans. Analyzing 2009 pension data from the Comprehensive Annual Financial Reports of the states, the Pew Center on the States (2011) ranks North Carolina as the fourth best funded state retirement plan with a funding ratio of 97 percent.[34] Still, many states have been making major changes in their retirement plans. In most states changes will apply only to new employees. However, some states whose plans are facing substantial funding problems have been altering the benefits for current workers and reducing COLAs for current retirees. In this environment, terminated workers may question whether their pension plan will remain unchanged for 10, 20 or 30 years. Doubts about the stability of the

1,677 requested an LSD between two and five years after leaving the retirement systems. Thus, ninety-one percent of all LSD's paid in 2010 were to individuals who left public employment within the last five years.

[33] An interesting thought experiment is to consider a hypothetical pension plan with all the characteristics of the North Carolina plan except that there is no annuity benefit. This simplifies the distributional choice to taking an immediate LSD or leaving the account open and take the LSD at some future date with the account balance increasing by 4 percent per year. If we could observe individuals covered by such a plan, it would be interesting to know the distribution of when workers accepted an LSD. In essence, this becomes a portfolio choice with the pension serving as a guaranteed value fund with a 4 percent return. Depending on personal characteristics and the size of the pension account, we would probably observe some variation in the time since termination that the LSD is requested.

[34] While most economists believe that the assumed rates of return in these reports is too high, the relative ranking of the North Carolina retirement system as one of the best funded retirement plans does not change when lower rates of return are employed (Novy-Marx and Rauh, 2011).

plans may have led some separated workers to be more likely to request an LSD.

Financial Literacy and Plan Knowledge. Considerable survey evidence indicates that workers have a low level of financial literacy and inadequate knowledge about their pension plans and how choices can affect the value of the retirement account (Lusardi and Mitchell, 2007; Clark, Morrill, and Allen, 2012 forthcoming). If workers who leave the North Carolina retirement system exhibit the same low levels of knowledge, it should not be surprising that they do not always select the option that has the greatest value as calculated by the system or by researchers. While the size of the LSD is easily available, separating workers may not be able to determine the value of the retirement annuity. Further, the retirement system sends all separated employees who request an LSD a personalized form letter (shown in Appendix B), regardless of vesting status or the relative size of the benefits. The letter contains a warning that if the refund is processed the individual will forfeit a future annuity benefit. We do not have any information on how many individuals first applied but then ultimately chose not to withdraw funds after having received the letter.

Recent economic research has also shown that defaults matter in the selection of various pension options and inertia associated with the acceptance of defaults could also be affecting the distributional choices (e.g., Madrian and Shea, 2001). Brown, et al. (2008) describe an important role for framing. If workers are choosing to accept defaults out of inertia or lack of understanding or are not appropriately valuing benefits, then public employers could improve separating workers' welfare by providing timely and accessible financial education and information.

VII.   Distributional Choices of Non-Vested Workers

Workers leaving public employment who have fewer than five years of service are not vested according to the rules of both retirement plans, TSERS and LGERS. Thus they are not eligible for a retirement annuity based on service at the time of termination. The lump sum distribution (LSD) available to them is the sum of their own pension contributions during their employment without any interest; however, they are not required to immediately request an LSD. Given the choice of money now or the same amount of money at some future date, we would expect that all non-vested terminated workers would request an immediate LSD. However, the data in Table 2 show that over the entire sample period only about one-third of these former public employees requested an LSD in the first year following termination.[35]

At first glance, this seems quite puzzling. Unlike the vested workers, non-vested terminated employees cannot look forward to a retirement annuity, will not be eligible for state provided retiree health insurance, and do not earn interest on their monies left with the retirement system. But, workers with short service may have paid very little attention to their pension accounts and upon termination may be unaware of the value of their account and the distributional option available to them. Inertia is often given as an explanation of certain types of behavior and could also be a factor in lack of immediate LSD's.[36]

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[35] Using a longer time series, it would be interesting to discover whether these individuals ever return to public employment in North Carolina and ultimately become vested in the retirement plan, whether they ever request an LSD, or whether these funds are permanently lost to the individual.

[36] Interestingly, inertia may be overcome by certain events. The state retirement system reports that requests for lump sum distributions from previously terminated workers often spike just before Christmas.

Still, there may be a fully rational reason for a separating employee to leave the monies in the system even if not vested. Employees who leave public employment but who anticipate returning to a government job may have an economic incentive to leave their pension accounts open, as returning civil servants who have not closed their pension account can count prior years of service in the determination of future retirement benefits. If this motive explains the distributional choices of non-vested employees, it would indicate rational decision making based on considerable knowledge of the pension plan. Family circumstances, such as the birth of a child or relocation, can also result in individuals quitting current employment and having temporary periods outside the labor force. The public sector is relatively large and all public employees are covered by the same system offering considerable opportunities for future employment in either TSERS or LGERS. Plan rules allow past service to be counted toward future retirement benefits provided that the individual left his account balances in the system. Nevertheless, the analysis shown in Table 4 does not support the hypothesis that expectations of returning to work is a cause of keeping one's account open.

To further examine the distributional choice of non-vested employees, we estimated a linear probability model with the dependent variable being an indicator for whether the separating worker chose to withdraw their account and accept the LSD from the retirement plan within one year of terminating employment. The results of this regression are presented in Table 5. Controlling for account balance at separation, men were more likely to withdraw money. This could be due to less inertia or more knowledge among men. Interestingly, younger workers were significantly less likely to withdraw funds than older workers, again potentially because of lack of knowledge or because of a higher likelihood to return to work. As was the case for vested employees, members of TSERS were significantly less likely to accept an LSD than those

in LGERS. Once again, we find an interrelationship between years of service and the account balance at separation. In the specification without the account balance (column 1), additional years of service result in a higher probability of having accepted an LSD; however, when the account balance is added to the specification, greater years of service are associated with a lower probability of having accepted an LSD.

[Table 5]

VIII. Cash Distributions or Rollovers

Terminated employees who have requested an LSD have the option of directly receiving a check or having the funds sent from the retirement system directly to another tax qualified account, often an IRA. This form of distribution from a defined benefit plan is typically called a "rollover" of pension funds (see Figure 1). If the funds are rolled over, the monies are not counted as current income to the taxpayer, nor does the individual incur any tax penalty associated with the early withdrawal of funds from a retirement account. Thus, money that has been rolled over remains a component of the individual's retirement wealth and can be invested through the new tax qualified plan.

The impact of the rollover on income in retirement will depend on the investment choice and subsequent returns compared to the ultimate annuity that a vested worker could receive in the future. In our calculations, the future annuity is discounted at a nominal rate of 5.8 percent. Thus, if the worker earned returns in excess of 5.8 percent, she might be able to purchase an annuity at retirement with a benefit greater than the benefit paid by the pension system. However, the annuity market for an individual is relatively thin and includes fees so the worker

would likely have to earn a return greater than 5.8 percent in order to be able to purchase a comparable benefit in retirement.[37]

If the terminated worker requests a check be directly sent to her, the distribution will be subject to personal income tax in the year it is received. In addition, because all workers in our sample are under age 50, they would have to pay a tax penalty for an early distribution. Once received, the monies can be spent on current consumption or to pay off outstanding debts, or it can be saved. Of course, if the monies are spent, potential income in retirement is reduced. Our data file identifies whether the LSD was rolled over or paid as a cash distribution; however, we have no information on how the funds were subsequently used by terminated workers.

The likelihood that the funds will be spent and create a "leakage" from retirement saving has concerned many policy analysts. To investigate the possibility of leakage from retirement saving, we estimate the manner in which LSD's are sent to terminated employees. The sample includes all individuals who left either of the two North Carolina retirement systems in 2007 and 2008 and who requested an LSD. Overwhelmingly, workers who requested an LSD wanted to receive a cash distribution; almost 90 percent of these individuals were sent a check directly from the retirement system.[38]

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[37] In addition, the retirement annuity from the state plan is approximately a real annuity with benefits typically being increased each year by the legislature at a rate near the level of inflation. In contrast, the annuity that one could purchase in the market under these assumptions would be a nominal annuity.

[38] From October 2007 to the present, separating workers have the option of taking a partial rollover and requesting the balance in cash. These are recorded as rollovers in the data, and we have no way to distinguish between full or partial rollovers. Therefore, our estimate of "leakage" may be understated since some of those rolling over funds could also be taking out some cash. We also expect that some separating employees do take cash and deposit it into a tax qualified account themselves within the 60 day

Table 6 reports the results from four separate regressions, along with the means of the variables include in the analysis. The regressions are for alternative samples: all terminated employees who requested an LSD, all vested workers receiving an LSD, only vested employees with salary information in the data, and all non-vested individuals that received an LSD. The estimated coefficients are similar across the four sets of analysis. Oddly, vested employees were 6.9 percentage points more likely to request a cash payment. Workers separating in 2008 were over 2 percentage points more likely to receive a direct check from the system while men were 3 to 4 percentage points more likely to accept cash. Non-vested participants in TSERS were 1.9 percentage points less likely to receive a cash distribution; however, there were no differences between vested members of TSERS and LGERS.

[Table 6]

For non-vested workers, an additional year of service increased the probability of accepting a check by 4.8 percentage points. Recall that the maximum years of service for this group is five. Older non-vested employees were slightly more likely to have received a cash distribution while age was not a factor for vested employees. For all groups, larger account balances significantly increased the probability of rolling the funds over into a tax qualified account. This may reflect the desire to avoid the higher tax and penalties associated with the cash distribution.

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allowed period. We have no way of knowing how many workers exercise this option, either. Thus, the estimate of 90 percent leakage is slightly low because of partial rollovers and slightly high because of indirect rollovers not being observed.

The most important finding from this analysis is that almost 90 percent of terminated workers that requested an LSD opted for a cash distribution. Given the economic conditions that prevailed during this period, one should not necessary conclude that this magnitude of leakage from retirement saving prevails under normal situations. Combining these results with those presented earlier that roughly one third of all terminated workers requested an LSD, we estimated that approximately 28 percent of all terminated workers closed their retirement accounts and received a cash distribution within one year of separation.

IX.   Key Findings and Conclusions

Numerous studies have examined the distributional choice of pension participants. For the most part, these earlier papers focused on the private sector and used survey data that was based on recollection instead of real time decisions. Much of this literature tries to explain *The Annuity Puzzle*: why such a large proportion of vested terminated workers select lump sum distributions instead of the annuity option that is usually available. Reasons postulated include workers having very high discount rates and not appreciating the longevity insurance value of the annuity. In addition, terminating workers may have bequest motives or may be concerned about having liquid assets in the event of a health shock.

In general, economic studies of the Annuity Puzzle have not explicitly examined public retirement plans and the lump sum versus annuity choice by public employees. Our analysis shows that public employees make very different decisions than similar workers in the private sector. State pension plans offer very different distributional choices compared to private sector retirement plans. In contrast to private sector plans, which are constrained by law to offer lump sum distributions that are greater than or equal to the present value of the future annuity, in

public sector pension plans the LSD is based on employee contributions and credited interest and is not directly linked to the value of the life annuity.

In this analysis, we provide a detailed picture of the distribution decisions of workers ages 18 to 49 that separated prior to retirement from public pension plans in North Carolina between 2007 and 2008. Upon separation, individuals must decide whether to leave their money in the retirement system or to accept a lump sum distribution (LSD) of their account balance. Our data are from the administrative records of the North Carolina retirement systems and include actual distributional choices for all separating workers. Examining plan characteristics, we found that for younger workers and those with fewer years of service the LSD typically was larger in value than our approximation of the present value of the annuity. For almost three-quarters of the terminated workers ages 18-49, we estimate that the LSD had the greater value but surprisingly, only one third chose the LSD: the annuity puzzle in reverse.

We began this research with the objective of expanding and improving on these earlier papers by using administrative data that reported real time decisions. In addition, we chose to conduct one of the few examinations of pension choices in the public sector. The data analysis has revealed some interesting and unexpected results. We find that only one third of separating workers ages 18-49 requested an LSD within one year of separation. This fraction does not differ considerably by vesting status or by eligibility for retiree health insurance. When we approximate the relative present value of the annuity and LSD, we do not observe workers selecting the higher valued option in a consistent way. Thus, we conclude that separating workers are not responding to the incentives embedded in the pension plan.

One possible factor that might explain leaving accounts open is the expectation of returning to work within the system. We explored this possibility and find that workers that

withdrew their funds were actually more likely to return to work than those who left their accounts open. Additional evidence is needed over a longer time period to see if these individuals ever request their monies or if they ever return to work.

We calculate that the promise of retiree health insurance (RHI) is an extremely valuable benefit relative to the pension annuity. RHI is potentially important to separating workers decision-making. In addition, changes to RHI might have large impacts on the retirement wealth of State Health Plan (SHP) participants. Future work could consider how recent and proposed changes to the SHP might affect the decisions to terminate and retire and the choice of accepting annuities or LSD's. The lower withdrawal rate for participants in TSERS relative to LGERS could simply be a reflection of access to the SHP in retirement. But, it may also indicate differences in information given to departing workers, greater likelihood of returning to work in the state system, or differences in the approach of HR offices.

In a related paper, Clark and Morrill (2012) find that 90 percent of workers who separate from public employment and who are eligible for an immediate but reduced annuity (age 50 with at least 20 years of service) opt to receive an immediate annuity. Of those who are eligible for an immediate unreduced annuity (30 years of service, age 62 with 25 years of service, or age 65 with 5 years of service), 99 percent select an immediate annuity. Thus, for retiring public employees in North Carolina, almost all select an annuity option and reject the offer of an LSD. On the basis of these findings, it appears that retiring public sector employees in North Carolina are not part of annuity puzzle and instead overwhelming select annuities when they are offered. This is a finding that is consistent with the result presented in this paper for terminating employees who are not yet eligible for an immediate annuity.

One might expect that all non-vested terminations request a lump sum distribution since they are not entitled to a future retirement benefit and earn no interest on funds left with the system. Yet we observe that two thirds of those leaving the systems in 2007 and 2008 left their accounts open. What factors can explain this choice? Given the evidence on financial literacy and inertia in the general population, one might speculate that non-vested terminated workers are unaware of their ability to access these funds, do not understand that they have no claim on a future benefit, do not understand that they funds will not earn any interest, or simply do not take the time to request an LSD. Economic and psychological studies indicate that workers often merely accept default options. In this case, the default is to leave the account open and thus, workers leaving the system do not take the time to request a distribution of their pension account. To address this concern, the plan could change the default to be an LSD for non-vested workers. Clark and Morrill (2012) find a similar result for non-vested workers over the age of 50 with only 36 percent of terminated workers aged 50 to 59 selecting an LSD. While the proportion of those choosing an LSD rises somewhat with advancing age (50 percent of those over age 65 chose the LSD), it is hard to explain why these older non-vested terminating workers would leave their funds with the system.

Almost 90 percent of terminated vested and non-vested workers that selected a lump sum distribution decided not to have the funds directly transferred to another tax qualified retirement. This could reflect a perceived need for cash for current consumption or paying off debts. It might also be the result of poor understanding of the tax consequences of this choice and the need to save these funds for retirement. Of course, workers could still deposit the cashed-out benefits into an IRA themselves. Still, the high rate of cashouts suggests a sizeable reduction in retirement wealth accumulation.

We discuss several reasons why the distribution choice is potentially more complicated than a simple present value calculation, but do not find empirical evidence pointing to one particular story. On the contrary, we find that there may be an important role for defaults and workers may not be well informed about the value of their benefits. Since defined benefit plans are much more prevalent in the public sector, these findings have significant economic and policy implications.

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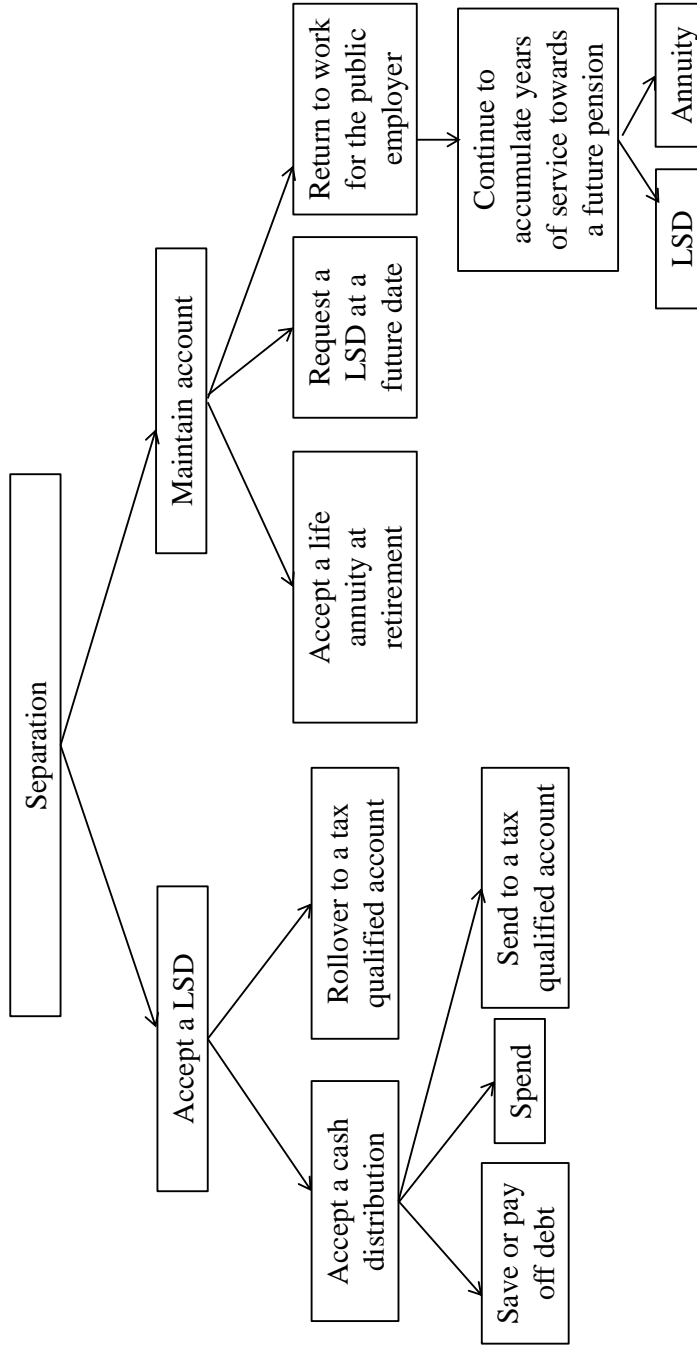
Figure 1: Choices facing separating employees

Years of Service: 5

Years of Service: 10

Years of Service: 15
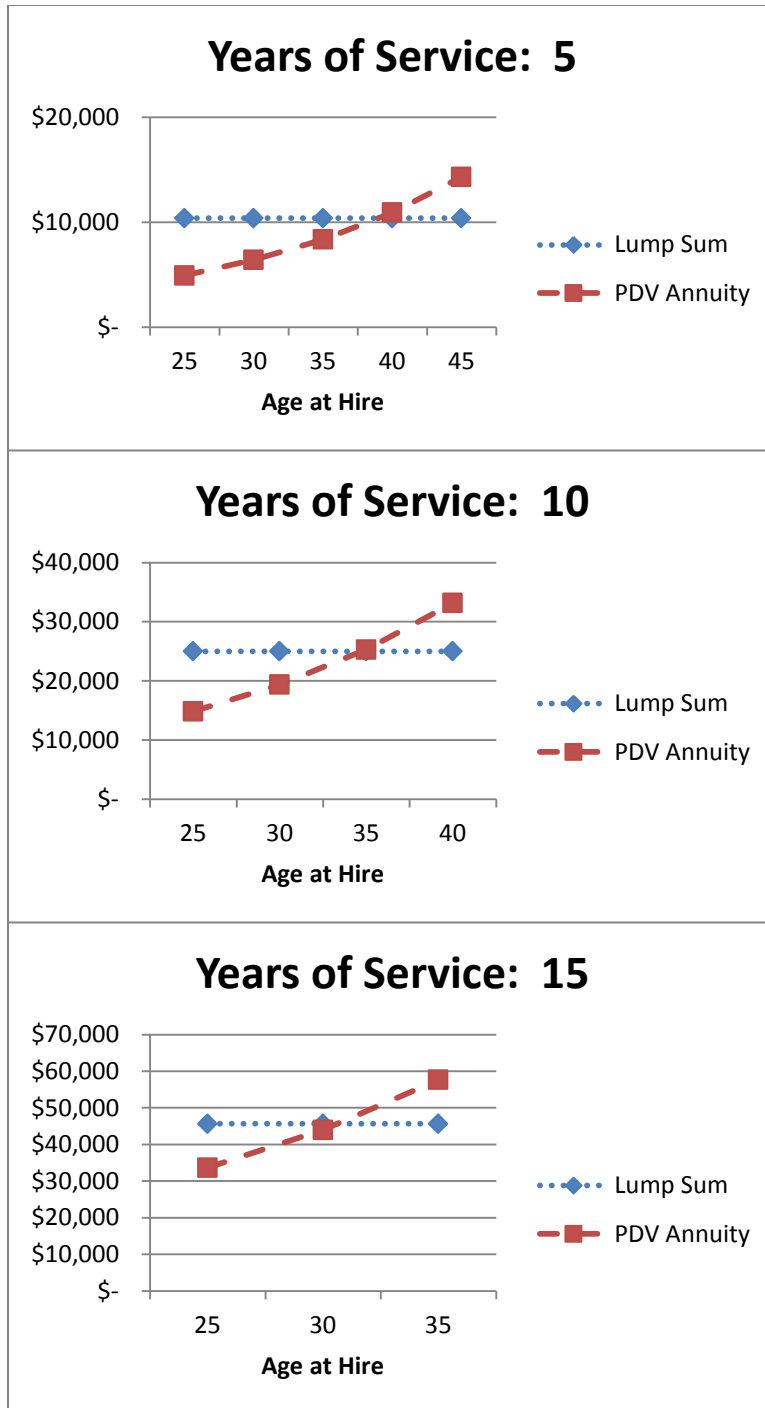
Note: Values are calculated for a hypothetical separating employee earning a starting salary of $30,000 per year with 3 percent wage growth.

Figure 2: Simulation of relative values of lump sum versus present discounted value of annuity
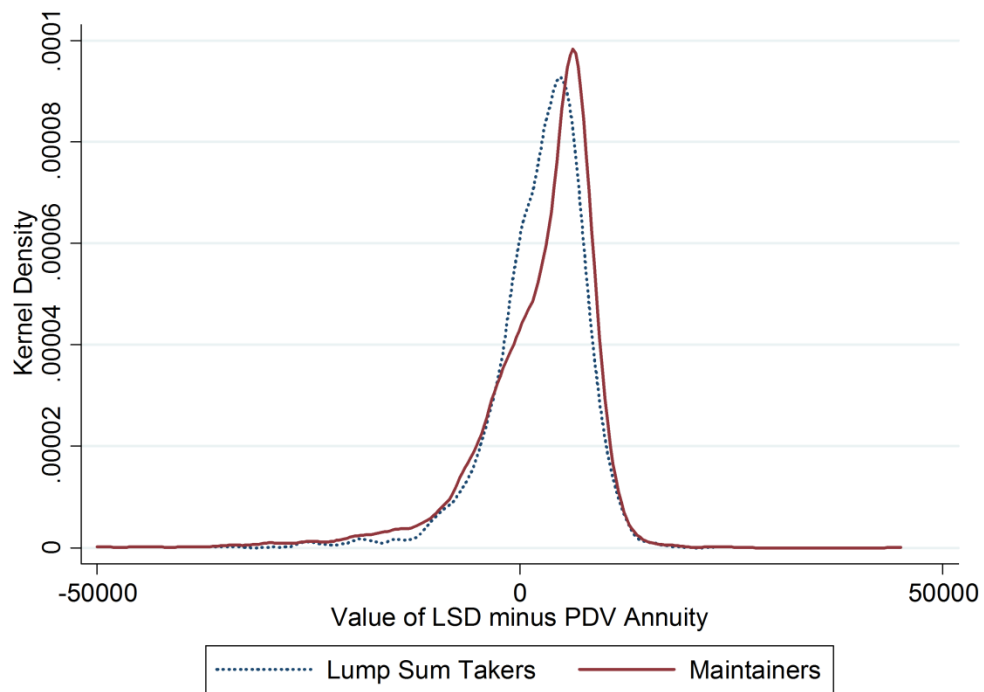
Note: Sample includes vested workers with non-missing salary information, with the value restricted to be between +/-$50,000 (N=8,875).

Figure 3: Distribution of amount that lump sum exceeds the imputed present discounted value of the future annuity benefit for those that withdrew funds versus those that maintained their account

Table 1: Value of Lump Sum and Present Discounted Value of Annuity for a Hypothetical Worker

Age at Hire	Age at Separation	Years of Service	Lump Sum	PDV Annuity	PDV Annuity + Health Insurance
25	30	5	$10,741	$4,916	$43,017
25	35	10	$25,521	$14,858	$53,585
25	40	15	$45,485	$33,694	$73,071
25	45	20	$72,074	$67,967	$108,026
25	50	25	$107,089	$129,212	$170,172
30	35	5	$10,741	$6,408	$45,135
30	40	10	$25,521	$19,377	$58,754
30	45	15	$45,485	$43,972	$84,031
30	50	20	$72,074	$89,167	$130,127
35	40	5	$10,741	$8,357	$47,734
35	45	10	$25,521	$25,287	$65,346
35	50	15	$45,485	$57,687	$98,647
40	45	5	$10,741	$10,906	$50,965
40	50	10	$25,521	$33,174	$74,134
45	50	5	$10,741	$14,308	$55,268

Notes: Values are for a hypothetical worker with a starting salary of $30,000 and wage growth of 3 percent. Calculations of the lump sum and present discounted value of the annuity are described in the text.

Table 2: Decision to withdraw funds within one year of separation

	Not Vested (<5 Yrs)		Vested (5+ Yrs)	
	N	% Withdraw	N	% Withdraw
Full Sample	35,731	35.58%	11,416	32.60%
SEPARATION YEAR				
Year: 2007	17,968	38.74%	5,653	35.29%
Year: 2008	17,763	32.39%	5,763	29.97%
GENDER				
Men	11,875	35.55%	3,962	34.93%
Women	22,042	30.51%	6,934	26.36%
Unreported Gender	1,814	97.35%	520	98.08%
TOTAL YEARS OF SERVICE AT SEPARATION (CALCULATED)				
Yrs Service Less Than 1	11,879	28.64%		
Yrs Service 1-3	16,694	38.13%		
Yrs Service 4	2,781	41.82%		
Yrs Service 5-19			11,084	32.83%
Yrs Service 20-39			282	12.77%
AGE AT SEPARATION (CALCULATED)				
Age 18-24	5,203	30.14%	17	29.41%
Age 25-34	15,373	34.26%	3,270	30.86%
Age 35-49	13,329	38.86%	7,087	33.62%
RETIREMENT SYSTEM				
LGERS	11,047	40.86%	3,654	40.53%
TSERS	24,684	33.22%	7,762	28.87%
JOB CLASSIFICATION (October 2007-December 2008 only)				
Education Professionals (1)	8,737	23.67%	2,810	19.50%
Skilled Labor (2)	2,993	36.99%	773	47.35%
Professional, Government, Admin (3)	6,164	39.84%	2,081	35.85%
University, Extension, and Community College (4)	323	35.60%	185	14.59%
Public Safety (5)	3,496	43.54%	1,153	45.36%
Health and Social Service Professionals (6)	2,238	33.65%	624	27.08%
RELATIVE SIZE OF LSD & PDV ANNUITY (non-missing salary and gender information only)				
LSD > PDV ANNUITY			6,448	33.33%
LSD $\leq$ PDV ANNUITY			2,442	31.37%

Notes: Sample is separating employees ages 18-49 who do not retire within one year of separation. Percent is those withdrawing their account balance within one year of separation.

Table 3: Withdrawal Choices of Vested Workers (non-missing salary only)

Dependent variable is the choice to withdraw the account balance within one year of separation (mean is 0.328).

	Mean/Percent	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Separated in 2008	51.9%	0.037	0.037	0.038	0.038	0.036	0.037	0.037
		[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
Male	37.5%	0.096	0.094	0.111	0.111	0.094	0.096	0.106
		[0.010]**	[0.010]**	[0.011]**	[0.011]**	[0.010]**	[0.010]**	[0.011]**
TSERS	66.0%	-0.091	-0.093	-0.089	-0.089	-0.089	-0.090	-0.087
		[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**	[0.010]**
Years of Service	8.8	0.007	-0.016	-0.021	-0.021			
		[0.006]	[0.009]+	[0.009]*	[0.009]*			
Years of Service^2		-0.001	-0.001	-0.001	-0.001			
		[0.000]**	[0.000]*	[0.000]**	[0.000]**			
Age at Separation	38.1	0.064	0.064	0.088	0.089	0.065	0.069	0.083
		[0.010]**	[0.010]**	[0.011]**	[0.012]**	[0.009]**	[0.010]**	[0.011]**
Age at Separation^2		-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
		[0.000]**	[0.000]**	[0.000]**	[0.000]**	[0.000]**	[0.000]**	[0.000]**
Final Average Salary (10K)	3.48	-0.120	-0.183	-0.210	-0.210	-0.130	-0.107	-0.110
		[0.009]**	[0.018]**	[0.019]**	[0.019]**	[0.009]**	[0.011]**	[0.012]**
Final Average Salary (10K)^2		0.006	0.007	0.008	0.008	0.006	0.006	0.006
		[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.001]**	[0.001]**
Account Balance (10K)	1.96		0.126	0.094	0.096		-0.033	-0.078
			[0.033]**	[0.044]*	[0.046]*		[0.013]**	[0.029]**
Account Balance (10K)^2			-0.005	-0.009	-0.009		0.001	0.0004
			[0.002]*	[0.004]*	[0.004]*		[0.001]	[0.003]
PDV Annuity (10K)	1.74			0.098	0.097			0.056
				[0.023]**	[0.024]**			[0.022]*
PDV Annuity (10K)^2				-0.001	-0.001			-0.001
				[0.002]	[0.002]			[0.001]
LSD $\geq$ PDV Annuity	72.5%				-0.003			
					[0.022]			
Constant		-0.595	-0.415	-0.680	-0.688	-0.551	-0.657	-0.840
		[0.179]**	[0.186]*	[0.191]**	[0.200]**	[0.178]**	[0.182]**	[0.190]**
Observations		8,890	8,890	8,890	8,890	8,890	8,890	8,890

Notes: Coefficients are from a linear probability model with standard errors in brackets. * significant at 5%; ** significant at 1%. See Table 2 for sample description and means of the dependent variable.

Table 4: Decision to withdraw funds within one year of separation

	Not Vested (<5 Yrs)		Vested (5+ Yrs)	
	N	% Withdraw	N	% Withdraw
Full Sample	35,731	35.58%	11,416	32.60%
ACTIVE WORKER ON 12/31/2009				
Returned to work	2,553	48.69%	1,262	43.82%
Did not return to work	33,178	34.57%	10,154	31.21%

Notes: See Table 2 for a description of the sample.

Table 5: Withdrawal choices of Non-Vested Workers
Dependent variable is the choice to withdraw the account balance within one year of separation (mean is 0.356).

	Mean/Percent	(1)	(2)	(3)
Separated in 2008	49.7%	-0.002	-0.005	-0.005
		[0.005]	[0.005]	[0.005]
Male	33.2%	0.048	0.046	0.045
		[0.005]**	[0.005]**	[0.005]**
0-1 Years of Service	33.2%	-0.113	-0.054	
		[0.007]**	[0.010]**	
1-2 Years of Service	28.2%	-0.020	0.009	
		[0.007]**	[0.008]	
3-4 Years of Service	12.2%	0.003	-0.018	
		[0.009]	[0.009]*	
4-5 Years of Service	7.8%	0.014	-0.023	
		[0.010]	[0.012]*	
Age at Separation	33.3	0.019	0.017	0.016
		[0.003]**	[0.003]**	[0.003]**
Age at Separation^2		0.000	0.000	0.000
		[0.000]**	[0.000]**	[0.000]**
TSERS	69.1%	-0.062	-0.061	-0.058
		[0.005]**	[0.005]**	[0.005]**
Account Balance at Separation	3.15		0.022	0.028
(thousands)			[0.002]**	[0.001]**
Account Balance at Separation^2			-0.001	-0.001
(thousands)			[0.000]**	[0.000]**
Constant		0.021	-0.016	-0.043
		[0.051]	[0.051]	[0.050]
Observations	35,731	35,731	35,731	35,731

Notes: Coefficients are from a linear probability model with standard errors in brackets. * significant at 5%; ** significant at 1%. See Table 2 for sample description and means of the dependent variable. Omitted category is 2-3 years of service. Also included in the specification but not reported is a dummy variable for gender unknown (5.1% of the sample).

Table 6: Choices to cash out versus roll over benefit

	Full Sample (88.7% cash out)		Vested (87.3% cash out)		Vested (Non-Missing Salary) (87.2% cash out)		Non-Vested (89.1% cash out)	
	(1)		(2)		(3)		(4)	
	Mean	Coeff.	Mean	Coeff.	Mean	Coeff.	Mean	Coeff.
Vested	22.6%	0.069 [0.011]**						
Separated in 2008	45.5%	0.024 [0.005]**	46.4%	0.031 [0.012]**	53.6%	0.029 [0.012]*	45.2%	0.025 [0.006]**
Male	34.1%	0.031 [0.005]**	37.2%	0.027 [0.012]*	43.1%	0.042 [0.013]**	33.2%	0.033 [0.006]**
Unreported Gender	13.9%	0.029 [0.008]**	13.7%	0.026 [0.018]			13.9%	0.031 [0.009]**
TSERS	63.5%	-0.017 [0.005]**	60.2%	-0.004 [0.011]	59.5%	-0.007 [0.013]	64.5%	-0.019 [0.006]**
Years of Service	3.42	0.024 [0.004]**	8.40	0.013 [0.009]	8.43	0.033 [0.015]*	1.96	0.048 [0.010]**
Years of Service^2		0.000 [0.000]		0.000 [0.000]		0.000 [0.000]		0.002 [0.002]
Age at Separation	34.9	0.009 [0.003]**	38.3	0.012 [0.011]	38.3	0.009 [0.012]	33.9	0.010 [0.003]**
Age at Separation^2		0.000 [0.000]*		0.000 [0.000]		0.000 [0.000]		0.000 [0.000]**
Final Average Salary (10K)					3.15	0.028 [0.029]		
Final Average Salary (10K)^2						0.000 [0.002]		
Account Balance (10K)	0.66	-0.237 [0.013]**	1.72	-0.128 [0.018]**	1.72	-0.208 [0.058]**	0.35	-0.487 [0.029]**
Account Balance (10K)^2		0.020 [0.002]**		0.008 [0.002]**		0.013 [0.005]*		0.074 [0.012]**
Constant		0.739 [0.055]**		0.682 [0.200]**		0.657 [0.237]**		0.729 [0.059]**
Observations	16,425		3,719		2,912		12,706	

Notes: The sample is those taking a lump sum. The dependent variable is the choice to cash out the account balance within one year of separation (active termination refund or active termination refund federal tax). Coefficients are from a linear probability model with standard errors in brackets. + significant at 10%; * significant at 5%; ** significant at 1%. Sample is individuals taking a lump sum, 10 observations are dropped due to missing information on disposition choice.

APPENDIX A: Data Construction

The initial sample includes all individuals that separated employment in 2007 or 2008. The variable used for this is *last_cont_date* (i.e., the date of the last contribution to the account). The initial raw sample is N = 85,351. Appendix Table A1 reports the sample selection criteria used.

RETIREMENTS
Following the advice of the state retirement system's office, we define direct retirements as those who claim an annuity within one year of separation. Because our project is concerned with disposition choice for those separating prior to retirement, we have chosen to remove those that retire within one year of separation from our sample.

MULTIPLE SPELLS
We can observe multiple spells in the data for those in the ORBIT system, but do not have access to all past (or future, obviously) spells. For simplicity and consistency, we delete observations with multiple spells during our two year period.

TOTAL YEARS OF SERVICE
An individual's total years of service is not necessarily equal to his tenure at his employer. We can calculate the years of service as the separation date minus the start date. This will differ from the total reported years of service if an individual has either non-contributory or purchased service. There are three types of service reported in the data. First, membership service is the total years an individual worked and contributed to the retirement system. Second, non-contributory service includes qualified military service, disability (including maternity leave), or converted sick-leave. Non-contributory service does not count towards service in the final annuity calculation. Non-contributory service is "creditable" and does count towards vesting and eligibility for benefits. Third, purchased service reflects years of service an individual pays for from an eligible period of service. Examples include withdrawn service (with interest), out-of-state service, educational leave, temporary or part-time local and state service, worker's compensation leave, or local or federal government service. Purchased service is creditable and qualifies the individual for benefits except vesting.

We define years of service in three ways:
  (1) To determine vesting status, membership and non-contributory service must equal five years.
  (2) The variable "years of service at separation" used in the tables is equal to the sum of all three types of service, membership, non-contributory, and purchased.
  (3) To calculate the value of the annuity, we use the sum of membership and purchased service.

To maintain data quality, we restrict the sample to those whose calculated years of service (date of termination minus date of hire) and membership service are at least 0.08 years (approximately one month) each.

ACCOUNT BALANCE INFORMATION
For active accounts: CURRENT_ACCOUNT_BALANCE, includes interest only if vested. Missing values in this variable are likely caused by an employer erroneously reporting someone as meeting the requirements to participate in the retirement system, but really the person is a contractor or part-time employee. The employer then corrects that entry, taking back the contributions and leaving $0 in the account. The account is still ACTV because the contributions were reversed, rather than withdrawn. These observations have been dropped.

For active accounts, the interest rate used is 4% and the account balance must be discounted at 4% to get the account balance at termination.

For closed/withdrawn accounts: REFUND_AMT is the amount refunded. If not vested, the refund amount is just the individuals' contribution without interest. The account balance at separation is therefore equal to the refund amount for those not vested. For those who were vested, the account balance at separation is equal to the refund amount adjusted/discounted by the interest rate. This calculation uses a standard 4% interest rate.

REF_PAYMENT_TYPE_CODE is how this amount was received (cash refund, sent to beneficiary after death, or rolled over).

For accounts closed/retired prior to 2010 but after separation:
ACCOUNT_BALANCE_AT_RETIREMENT equals the employee contributions plus interest, i.e. the lump sum that the employee could have received immediately prior to starting the retirement annuity. This does NOT equal the annuity amount.

FINAL AVERAGE SALARY
Last year's salary is available on the data set, but appears to be measured with considerable error. We use records of salaries paid from 2003 to 2007 to impute the average salary over the last full four calendar years of work. The annuity formula uses the highest four consecutive years of salary, so our measure will be weakly smaller than the true annuity value.

Appendix Table A1: Sample Construction

Full Sample, N = 85,351	

Restriction	Number Dropped
Time until withdrawal less than -90 days	138
Time until retirement less than -90 days	5
Retired within 1 year of separation	20,122
Date of birth year is 1900 or 1901	716
Age when hired less than 16	40
Status code is not active, closed/withdrawn, or closed/retired	4
Retirement system is not TSERS or LGERS	13
Age 70+ at date of hire	248
Age <18 at separation	5
Missing years of service	3,954
0 years of service	98
Total years of service >40	4
Membership years of service < 0.08 years (approximately 1 month)	15
Calculated years of service (separation date-hire date) < 0.08 years	1,132
Multiple spells in sample period	1,266
Account balance is missing	209
Age at separation is 50+	10,200

Full Sample: 47,147 workers; 11,416 vested and 35,731 non-vested.	
Calculate PDV Annuity Additional Restrictions:	
Non-missing gender	520
Non-missing salary	4,960

Final Sample for Vested with Non-missing Salary Information N = 8,890	

Appendix Table A2: Withdrawal Choices of Vested Workers

Dependent variable is the choice to withdraw the account balance within one year of separation (mean is 0.326).

	Means	**(1)**	**(2)**	**(3)**	**(4)**
Separated in 2008	53.41%	0.012	0.014	0.010	0.014
		[0.008]	[0.008]	[0.008]	[0.008]+
Male	35.49%	0.071	0.084	0.064	0.085
		[0.009]**	[0.009]**	[0.009]**	[0.009]**
TSERS	69.56%	-0.102	-0.109	-0.101	-0.110
		[0.009]**	[0.009]**	[0.009]**	[0.009]**
Years of Service	9.26	-0.007	0.007		
		[0.005]	[0.005]		
Years of Service^2		0.000	0.000		
		[0.000]	[0.000]*		
Age at Separation	38.38	0.040	0.044	0.031	0.048
		[0.009]**	[0.009]**	[0.008]**	[0.008]**
Age at Separation^2		0.000	-0.001	0.000	-0.001
		[0.000]**	[0.000]**	[0.000]**	[0.000]**
Account Balance (10K)	1.92		-0.072		-0.078
			[0.009]**		[0.007]**
Account Balance (10K)^2			0.004		0.004
			[0.001]**		[0.001]**
Constant		-0.373	-0.467	-0.237	-0.486
		[0.158]*	[0.158]**	[0.158]	[0.158]**
Observations		11414	11414	11414	11414

Notes: Coefficients are from a linear probability model with standard errors in brackets. * significant at 5%; ** significant at 1%. See Table 1 for sample description and means of the dependent variable.   The sample here is all separating workers, including those without salary information.   The specifications are similar to those reported in Table 3 in the text, except here we do not include any information on salary or size of the annuity. Also included in the specification but not reported is a dummy variable for gender unknown (4.6 percent of the sample).

Appendix B: Retirement System Communications

Regardless of the number of years of service, any separating employee requesting a lump sum distribution receives a personalized copy of the following letter which includes the individual's years of retirement service credit. We do not have information on how many individuals first applied but then ultimately chose not to withdraw funds or on the effectiveness of this intervention in particular. The data we have only reflect the final choice that separating workers made.

Form 5 Letter:

We have received your Withdrawing Your Retirement Service Credit and Contributions (Form 5) for the Teachers' and State Employees' Retirement System on 02/15/2010 and have begun to process your request.

According to state law, we cannot issue a refund within sixty (60) days of the last day you were employed by a contributing employer.

Although we are proceeding with this refund, we find that you have 11.58330 years of retirement service credit. If you have 5.0000 or more years of retirement service credit, you may have a vested right to apply for monthly retirement benefits as soon as your age qualifies you. You may apply for a full retirement at age 65 (or at age 55 if a Law Enforcement Officer). You may apply for a reduced retirement at age 60 (or at age 50 if a Law Enforcement Officer with 15 years of membership service). You may also be entitled to further benefits in connection with your retirement, but these will be forfeit if you proceed with a refund. Please notify us in writing if, considering these benefits, you wish to cancel your application for a refund.

If you accept further employment covered by the Teachers' and State Employees' Retirement System before you receive your refund check, you should notify us immediately. We are not permitted to issue a refund to a person who has returned to service.

If we may be of further assistance, please contact us at the address or telephone number listed below.

Sincerely,