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Essays on the Economics of Public Sector  
Retirement Programs: Dissertation Summary

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# Essays on the Economics of Public Sector Retirement Programs

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This thesis investigates the influence of retiree health and pension policies on the retirement decisions of public sector employees. Chapter 1 documents the central role of eligibility for subsidized retiree health insurance (RHI). Using administrative records obtained from the Pennsylvania State Employees' Retirement System, the analysis finds that the well-documented spike in the separation rate at the normal retirement age almost completely disappears in the population of workers not yet eligible for subsidized RHI. A second set of results exploits quasi-experimental variation in plan design to show that increasing the service requirement for subsidized RHI stretches the distribution of separations: early separations occur earlier and late separations occur later.

Chapter 2 presents a structural analysis of the retirement decision for the same employees. Existing models of the retirement decision treat eligibility as a fixed characteristic of the worker rather than one that evolves over the career. This chapter estimates a model of life-cycle labor supply and uses it to simulate labor supply behavior under different health and pension policies. Changes in the eligibility requirements for subsidized RHI induce dramatic changes in retirement timing that would be missed in models that do not account for an employer's eligibility criteria.

Chapter 3 turns to the defined benefit pension plans common in the public sector. These plans create complicated incentives in favor of continued work at some ages and in favor of retirement at others. The strength of these incentives depends on many factors, such as the age of initial employment and the number of years on the job. Because employees differ along these dimensions, the value of the pension benefits earned over the course of a career varies substantially—even among employees with the same total earnings. This chapter investigates the incentive effects and distributional consequences of four stylized plan designs. It derives simple formulas for the accrual rate of pension wealth and the distribution of benefits under each of the plans and uses these formulas to gain insight into the incentives and risks they create.

## Chapter 1

### Retiree Health Insurance and Job Separations: Evidence from Pennsylvania State Employees

State governments face unfunded liabilities of more than \$600 billion arising from the retiree health benefits they have promised to current and past employees (Pew Center on the

States 2012). The assets currently set aside to pay for these benefits cover only 5 percent of the accrued liability. Furthermore, struggling with reduced revenues and other spending priorities, states are choosing not to make the contributions necessary to fully fund their plans. In fiscal year 2010, Arizona was the only state to do so. Rather than increase taxes or reduce spending on other programs, many states are choosing to continue on a pay-as-you-go basis and cut future benefits.

Unlike pensions, retiree health benefits have few legal protections and can be modified for both current workers and retirees (Clark and Morrill 2010). For this reason, reductions in retiree health benefits offer the possibility of substantial short-term savings for cash-strapped state governments. At the same time, any modifications to retiree health benefits implemented for current workers will have important effects on the state workforce. Age and service requirements in many plans create large financial incentives in favor of continued work in the years immediately preceding eligibility. Completing the last year of service required can be worth hundreds of thousands of dollars to employees who intend to retire immediately after doing so. After meeting the eligibility requirements, workers can keep their health coverage whether or not they remain on the job. As a result, employees' effective compensation rates decrease sharply. Understanding the labor supply response to these incentives is both interesting in its own right and critical to projecting the financial implications of any potential changes in retiree health benefits.

To gain insight into the effect of retiree health benefits on labor supply behavior, this chapter analyzes the experience of Pennsylvania state employees. Pennsylvania's retiree health benefits come in two forms: 1) guaranteed access to the state's pool for all annuitants, and 2) highly subsidized insurance policies for annuitants meeting additional age and service criteria. In the last decade, the state has introduced new fees, restricted plan choices, and restricted eligibility for subsidized RHI. This analysis focuses on Pennsylvania for two reasons. First, when the state restricted eligibility for subsidized RHI, it grandfathered employees meeting certain age and service criteria under the existing eligibility rules. This grandfathering provision created exogenous variation in plan design that can be used to understand the role of eligibility for subsidized RHI in employee separation decisions. Second, Pennsylvania's public records law provides extensive access to the employment records maintained by the state pension system, allowing for detailed analysis of the effect of the state's retirement benefits on employee behavior. Though obtained for a population of Pennsylvania employees, this chapter's findings are relevant for a much larger set of public sector employees. The structure of the eligibility requirements for subsidized RHI in Pennsylvania is typical of one of the three common forms in which retiree health benefits are provided to public sector employees in the United States.<sup>1</sup>

The primary data for the analysis are drawn from the member records of the Pennsylvania State Employees' Retirement System (SERS) and were obtained via public records requests. The extract contains quarterly earnings, annual hours, and key dates in the careers of more than 200,000 individuals who worked for the state between 2000 and 2011. The period captures 115,000 separations, including nearly 70,000 retirements. The data are rich enough to allow for the determination of an employee's eligibility for retiree health and pension benefits on any date in the 12-year period with a high degree of accuracy.

The chapter first investigates the effect of eligibility for subsidized RHI on the separation hazard. The eligibility rules for pension and health benefits partition the age and service space into five distinct regions. Employees who separate in each region are entitled to a different combination of benefits: no benefits, an early retirement pension with self-paid health insurance, an early retirement pension with subsidized health insurance, and so forth.<sup>2</sup> I estimate the separation hazard for each combination of age and service and examine changes in the hazard at the boundaries between the age and service regions defining eligibility for different benefits.

The striking finding of this analysis is that while the widely documented spike in the separation hazard at the normal retirement age is clearly present in the aggregate data for Pennsylvania state employees, it nearly disappears for the population that is not yet eligible for subsidized RHI at the normal retirement age. Eligibility for subsidized RHI at the normal retirement age during the years used in the hazard estimation requires at least 15 years of service. For the cohort of employees reaching normal retirement age with exactly 15 years of service, the probability of separation increases from 4 percent in the year before eligibility to 26 percent in the first year of eligibility.<sup>3</sup> In contrast, for the cohort of employees reaching the normal retirement age with 14 years of service—and therefore ineligible for subsidized RHI—the separation probability is essentially unchanged. However, one year later, when this second cohort of employees becomes eligible for subsidized RHI, it jumps 31 percentage points.

The hazard analysis also reveals the importance of eligibility for subsidized RHI in motivating early retirement. Employees in their late 50s begin separating in meaningful numbers only after they become eligible for subsidized RHI. For example, the probability of separation for employees becoming eligible for subsidized RHI at age 57 increases from 3 percent at 56 to 15 percent at 57. Furthermore, this increase in the hazard largely persists in the years between eligibility for subsidized RHI and the normal retirement age. The effect of eligibility for subsidized RHI on employees in their late 50s found in this analysis is far larger than that found in previous studies. However, prior work has generally pooled all employees at firms that offer RHI, regardless of current eligibility status, and compared them with employees

at firms that do not offer RHI. The data for Pennsylvania employees show that this can be quite misleading. Less than half of the state workforce is eligible for subsidized RHI at any age before the normal retirement age.

The chapter next turns to the analysis of a quasi-experiment arising from an increase in the service requirement for subsidized RHI. Effective July 1, 2008, the state increased the service requirement for subsidized RHI at or after the normal retirement age from 15 to 20 years. A population of employees nearing eligibility was grandfathered under the existing rules, thus allowing for sharp identification of the effect of the new eligibility rules using discontinuity methods. The more restrictive service requirement decreased the probability that an employee on January 1, 2003, just short of the grandfathering threshold, would separate over the next 9 years by 10 percentage points, from 73.4 percent to 63.8 percent.<sup>4</sup>

As the decision to separate is a choice of when, not if, the object of fundamental interest is the distribution of separations over time. Using the same grandfathering variation, I estimate the effect of the policy change on the distribution of separations for workers exactly at the grandfathering threshold. I find that the increased service requirement stretches the distribution of separations: early separations occur earlier and late separations occur later. Facing a more stringent service requirement, some employees who would have worked until eligibility before the reform decide that the benefits are not worth the additional years of work required after the reform. These employees separate even sooner under the postreform eligibility rules than they would have under the prereform rules. At the same time, other workers with identical characteristics decide that the value of the subsidies is large enough that the additional work required is worth it. These employees work longer under the postreform rules than they would have under the prereform rules. The relative importance of these two effects depends on the age and the binding eligibility requirement for the affected workers in the prereform period. Older workers already eligible for a pension respond primarily by accelerating separations while younger workers not yet eligible for any pension benefits show no evidence of acceleration. In all age groups, some employees delay separations, but the number of employees delaying separation is modest at older ages.

Finally, I adapt the hazard estimation procedure to simulate the effect of two additional restrictions in eligibility for subsidized RHI on employee separations and on the value of the state's health and pension obligations. I show that a five-year increase in the service requirement for subsidized RHI before the normal retirement age would reduce the present value of obligations by nearly \$500 million, or 7 percent. However, as such a policy would encourage additional work at exactly the ages when pension accruals are highest, I find that it would also increase pension obligations by \$100 million. That is, the increase in pension liabilities associated

Select Figures from “Retiree Health Insurance and Job Separations: Evidence from Pennsylvania State Employees”

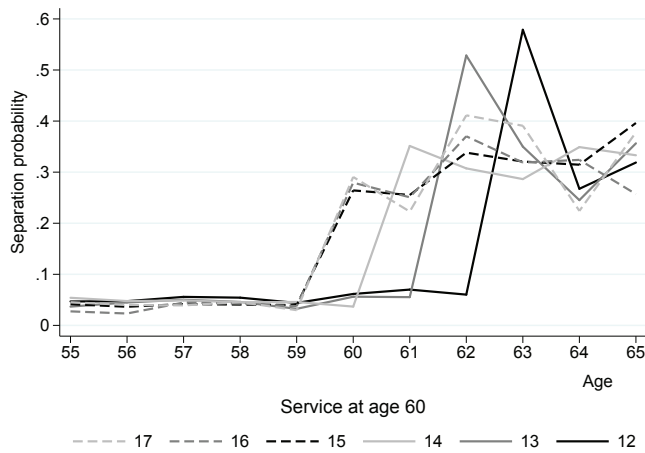


Figure 5.1. Effect of Eligibility for Normal Retirement With and Without Eligibility for Subsidized Retiree Health Insurance

with the restriction in eligibility for subsidized RHI would offset about 20 percent of the reduction in retiree health liabilities. In contrast, for a restriction in eligibility after the normal retirement age the pension plan provides additional savings. Pension accruals at these ages are low, and the additional employee contributions made by the individuals who choose to work longer in response to the eligibility restriction more than offset the increase in pension benefits.

Chapter 2

A Structural Analysis of Retirement with Retiree Health Insurance

In the United States, people obtain health insurance from a wide range of sources, including an employer, a spouse’s employer, the government, unions or professional associations, and the private market (Fronstin 2012). In each case, the price paid for an insurance policy reflects a complicated set of implicit cross-subsidies. Adding a spouse to an employer policy, for example, can cost much less than an actuarially fair premium. As a result, decisions not directly related to health insurance are affected by the provision of health insurance. One decision that is strongly influenced by individuals’ desire to maintain health insurance coverage is that of when to retire (French and Jones 2011; Leiserson 2013; Nyce et al. 2011; Rust and Phelan 1997). Retirement often results in a change in the source of health insurance coverage, canonically from employer-provided insurance to Medicare.

Understanding the effect of health insurance on retirement behavior has become a critically important policy

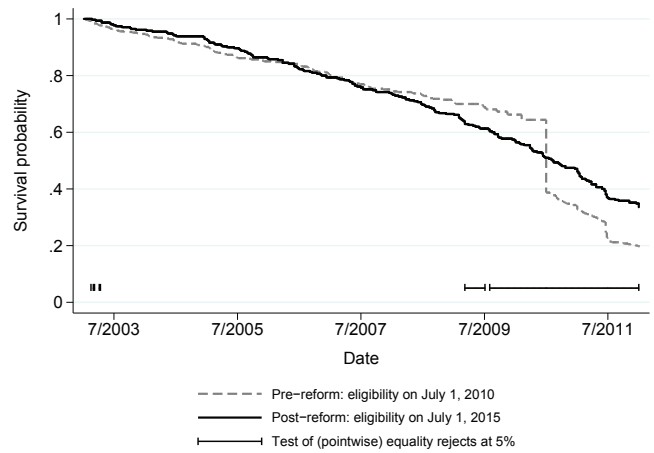


Figure 6.5. Employment Survival Functions Under the Pre/Post-Reform Eligibility Rules for Sub. RHI, Workers Age 54-59 on December 31, 2002 Projected to Exactly Meet the Grandfathering Req. in 2008

issue. Increasing per capita medical expenditures have led to numerous proposed and enacted policies intended to address concerns about coverage, cost, and quality. These proposals include both those intended to affect the health insurance of the retired population (such as increases in the eligibility age for Medicare) and those directed elsewhere but which will have important subsidiary effects on retirees or retirement behavior, such as subsidies for the purchase of insurance in the private market that facilitate retirement prior to eligibility for Medicare.

Using a sample of public sector employees in Pennsylvania whose decisions to retire are strongly influenced by the eligibility rules for the subsidized RHI offered by their employers, this chapter estimates a structural model of the retirement decision that can be used to simulate counterfactual retirement distributions under alternative health and pension benefit policies. While previous work has documented the reduced form importance of RHI (see, e.g., Karoly and Rogowski [1994]; Leiserson [2013]; Madrian [1994]; and Nyce et al. [2011]), it can be difficult to find reduced form evidence on policy impacts relevant to potential future policy changes, as there is substantial heterogeneity in the design of health and pension plans across firms. Furthermore, existing structural work has lacked information about the eligibility requirements for benefits within the firm. Such work is therefore unable to inform discussion of plausible policy options—like those recently implemented in Pennsylvania and under consideration in many other states—that would change benefits along exactly this dimension.

The estimates suggest that restrictions in eligibility for subsidized RHI can be expected to induce dramatic shifts in the distribution of retirements. In contrast, reductions in

the generosity of pension benefits may have more modest effects. This difference in the behavioral response arises because eligibility restrictions for health insurance typically involve very large reductions in benefits in a small number of years and thus a dramatic increase in the financial incentive for continued work in those years. Changes in pension benefits tend to have a much more diffuse impact over a much larger number of years. Of course, one could design cuts in pension benefits that do not have this characteristic. Crucially, the simulated retirement distributions produced by the model capture the interactions between the state's retiree health and pension benefits and indicate that changes in employee behavior in response to changes in either health or pension benefits depend substantially on the employee's eligibility for the other benefit.

The key contribution of this analysis is to exploit detailed knowledge of the institutional regime in Pennsylvania, where different employees become eligible for subsidized RHI at different ages, in order to estimate a structural model of retirement behavior that can be used to simulate counterfactual retirement distributions under alternative policy regimes. This exercise contrasts with existing structural analyses of the effect of health insurance on retirement, which typically assume that eligibility for retiree health benefits is a fixed characteristic of each employer-employee pair. In addition to the rich variation in eligibility for RHI at the individual level, a second advantage of the current setting is the large size of the population covered by a single institutional regime. Because all individuals used in the analysis work under the same regime, there is no need to map the rules of a pension plan into a low-dimensional state space and no consequent reduction in accuracy.

This chapter builds on an extensive literature estimating structural models of the retirement decision. Like much of the early work on pensions (Kotlikoff and Wise 1989; Stock and Wise 1990), it uses data for only a single firm where the rules are well known and can be implemented accurately in the empirical analysis. More recent work incorporating medical expenses (French and Jones 2011; Rust and Phelan 1997) has tended to use samples drawn from the entire population, allowing for a more general result but also forcing the authors to abstract from important institutional detail in the estimation for reasons of tractability and therefore sacrificing accuracy. None of the existing structural work incorporates data on the evolution of individual-level eligibility for RHI.<sup>5</sup>

## Chapter 3

### The Design of Public Sector Pension Benefits

The overwhelming majority of public sector employee pension plans follow a traditional defined benefit structure.<sup>6</sup> When employees retire, they receive an initial benefit equal to the product of three pieces: 1) an accrual factor specified

in the plan rules, 2) some notion of average earnings, and 3) the number of years on the job. In contrast, the defined contribution plans more common in the private sector do not specify a level of benefits after retirement. Instead, they provide employees with a specified contribution to a retirement account each pay period. Workers then invest these funds in a menu of financial products determined by the plan administrator.<sup>7</sup> When employees retire, they can use whatever funds they have accumulated in their investment accounts to support retirement consumption. In theory, and as suggested by the two names, the essential difference between defined benefit pension plans and defined contribution pension plans is the employee's exposure to risk in asset market returns. In practice, however, existing defined benefit plans combine insurance against market risk with two additional—and inessential—features: 1) a complicated set of incentives affecting labor supply decisions, and 2) a new source of risk in the adequacy of retirement savings arising from uncertain future labor market outcomes.

Traditional defined benefit plan designs provide substantially larger pension benefits to those retirees whose work histories follow particular patterns implicit in the plan provisions. By linking the level of pension benefits in retirement to the work history in this fashion, the plans create strong financial incentives for employees to follow these particular patterns of work and retirement. These incentives affect numerous different decision-making margins. The decision most frequently studied is that of a current employee considering whether and how long to remain on the job (Brown 2013; Chalmers, Johnson, and Reuter 2012; Friedberg 2011; Munnell et al. 2012a). The plans also affect the decisions to work overtime, increase responsibilities, or pursue a promotion. Similarly, they affect whether potential new hires accept job offers and whether former employees attempt to return to the employer at older ages after several years elsewhere.

Whether the pension plan encourages or discourages work at any particular age depends on numerous demographic, economic, and institutional factors, including the age at which an employee begins working for a public sector employer, the existence and duration of any gaps in the work history, and the pattern of earnings growth over the career. Because employees differ along all of these dimensions, the incentives created by the pension plan during the career, and the corresponding value of retirement benefits received after the conclusion of the career, vary substantially, even for employees with the same lifetime earnings.

By providing enhanced benefits to employees who follow particular patterns of work and retirement and thus creating incentives for certain labor supply behavior, traditional defined benefit plans necessarily provide reduced benefits to those employees who do not follow the specified patterns. Thus, the mirror image of the labor supply incentives created by the plans is a set of risks that an employee is unable or unwilling to follow the rewarded patterns. These risks can

arise for reasons beyond employee control, such as poor health events, financial shocks, government fiscal conditions, and changes in government policy. Or they may arise from learning about preferences, consumption needs, and other personal economic conditions that cause an employee to desire to follow an unexpected career path. As a means of insurance against these risks, individuals may accumulate additional personal savings outside the pension plan. They may also be less inclined to accept the job in the first place because of the risk.

The primary purpose of this chapter is to provide simple formulas for the work incentives and the distribution of benefits generated by four pension designs: 1) a nominal high-three average pension with actuarial early and delayed retirement, 2) a nominal high-three average pension with percentage reductions for early retirement, 3) an inflation-adjusted career average pension with actuarial early retirement, and 4) an indexed career-average pension with variable accrual factors and actuarial early and delayed retirement. The formulas develop our intuition about how and why existing policies affect labor market behavior and employee welfare, and they also facilitate the construction of alternative designs that preserve the defined benefit structure but allow for complete control over the other outcomes of the plan. For example, the financial incentive for continued employment in pension plans using high-three formulas, which base the pension benefits on a simple average of the three highest-earning years of the career, depends on trend inflation rates. If trend inflation is 1 percent, the incentive for continued employment is lower than if it is 3 percent. It is not clear why this dependence on inflation would be a desired feature of a pension plan. Similarly, the financial incentive for an individual with 10 years of experience to remain on the job depends on whether that individual started working for the public sector employer at age 35 or at age 45. Most arguments for retention incentives in pension plans suggest the use of service, not age.

A second purpose of this chapter is to provide a clear exposition of the incentives associated with different pension plans so that policymakers can choose to design plans with particular incentives. A common critique of proposals to replace existing pensions with alternatives that have more neutral work incentives (e.g., cash balance plans) is that such plans eliminate certain desired labor supply incentives, throwing out the baby with the bathwater. An oft-cited goal is to provide incentives for more experienced workers to remain on the job. The fourth class of pension plans examined in this chapter, the indexed career-average with variable accrual factors and actuarial adjustments for early and delayed retirement, can be used to construct pension plans that achieve the desired incentives without including the irrelevant incentives embedded in current designs. It maintains the defined benefit nature of the pension plans while at the same time directly controlling the work incentives created by the plans, limiting arbitrary redistributive patterns

across employees, and limiting incentives for individuals to manipulate earnings and labor supply in ways that do not advance public policy objectives.

The contribution of this analysis relative to previous analyses is the focus on simple analytic formulas that provide a framework for thinking about incentives in the general class of public sector defined benefit plans. As state and local government budget pressures continue to push in the direction of pension cuts, one way of reducing the harm of such cuts on public sector employees is to redesign the benefits so the plans use a given quantity of resources to greater effect. In such an environment, a general understanding of pension design will be crucial. Existing work has derived quantitative estimates of the pension incentives in particular plans (Costrell and Podgursky 2009; Johnson, Steuerle, and Quakenbush 2012); derived estimates implicitly in pursuit of some other objective (Samwick 1998; Stock and Wise 1990); or focused on particular channels through which the pension plans affect behavior (Diamond et al. [2010] on final pay plans; Munnell et al. [2012b] on vesting).

## Notes

1. The three most common forms of retiree health benefits in the public sector are 1) access to the state's pool with generous subsidies for the purchase of insurance if a retiree meets certain age and service criteria, 2) access to the state's pool with a per-year-of-service subsidy for the purchase of insurance, and 3) access to the state's pool with little or no premium assistance. Intermediate and hybrid forms also exist.
2. Throughout this chapter I refer to the insurance available to all annuitants regardless of age and service as self-paid. However, the state contributes \$5 per month toward the cost of this coverage.
3. To facilitate comparisons across age and service levels and comparisons with prior work, I report annual separation probabilities rather than the instantaneous hazard.
4. The analysis examines the population of employees on January 1, 2003, because the increased service requirement was formalized in collective bargaining agreements beginning in 2003.
5. The model estimated in Gustman and Steinmeier (1994) allows for the evolution of eligibility at the individual level, but the authors are forced to impute the eligibility rules because the data used in the paper do not contain the relevant information.
6. This work builds on previous joint work with Peter Diamond, Alicia Munnell, and Jean-Pierre Aubry. See, for example, Diamond et al. (2010).
7. In addition to the traditional limited menu, plans may offer a brokerage or mutual fund window through which employees can purchase a much wider array of securities.

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