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Teaching, Teachers Pensions and Retirement across Recent Cohorts of College Graduate Women

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This version: September 6, 2015

For presentation at the Women Working Longer Pre-conference to be held September 19, 2015
at the NBER, 1050 Massachusetts Ave, Cambridge MA

Acknowledgements: Thanks to Claudia Goldin for the invitation to explore these issues in collaboration with the other pre-conference participants and to the Sloan Foundation for financial support. I am also grateful to Corbin Miller for excellent research assistance and help with the public-use and RAND-created versions of the Health and Retirement Study and to Mohan Ramanujan for help with the restricted-use version of the Health and Retirement Study.

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Introduction

Labor force participation rates of college educated women ages 60 to 64 increased by 20 percent (10 percentage points) between 2000 and 2010. One potential explanation for this change stems from the fact that a lower proportion of the college-educated women in the more recent cohorts were teachers. This occupational shift could drive the recent increases in labor force participation because of how it altered pension eligibility (and wealth). Public school teachers are almost universally covered by defined benefit pensions and, generally, defined benefit pensions allow workers to retire at earlier ages than Social Security. Therefore, as the fraction of college-educated women without access to these defined benefit pensions expanded, the labor supply of college-educate women increased. I provide evidence supporting this hypothesis and show that older college-educated women who worked as teachers do not experience increases in labor force participation as large as their counterparts who never taught.

The Changing Nature of College-Educated Women's Occupations

Over the course of the last century, women made enormous strides in their educational attainment. In Figure 1, I reproduce Figure 1 of Godin, Katz and Kuziemko (2006), which plots college graduation rates (by age 35) by gender and cohort. Focusing on the cohorts most relevant for this study, in 1925 the female graduation rate starts around 5 percent and begins to climb. By the 1940 cohort, female graduation rates had more than doubled and by the 1950 cohort they doubled again, reaching nearly 25 percent.

The increase in graduation rates coincided with a shift in the occupations of college educated women. In Figure 2, I use data from the CPS to plot the fraction of employed college-

educated women who report being a teacher between the ages of 46 to 50, by cohort.¹ The fraction of teachers declines from around 40 percent for the cohorts born before 1940 to 30 percent to those born in 1950 and further still to just 15 percent for the cohorts born after 1959. This shift in occupational choice may have implications for the labor supply of older women because, as described in the next section, teachers, who are mostly public employees, have access to pensions that are quite different than those in other sectors.

A Brief History of Teacher Pensions

Although the first statewide systems of teacher pensions in the U.S. were introduced in the last quarter of the 19th century, very few were in place before 1910 (Clark et al. 2003). At that time, Social Security did not exist and teaching was an occupation largely reserved for unmarried women. Those who remained in teaching for many years were those who never married and therefore could not rely on a spouse's income for retirement support.² As such, the pension systems for teachers were seen as a mechanism for providing late-in-life support to women who might not otherwise have it, and during the early part of the 20th century, the use of pensions expanded. By the late 1920s, teachers in 28 states were covered by pensions.³ By 2013, public school teachers in all states participated in a publicly funded pension plan.

¹ The Current Population Survey only asks information about occupation and industry of those who report being employed. The fraction of college educated women who are employed across the cohorts born between 1920 and 1965 varies little. Also, I use women ages 46 to 50 because doing so allow me to create a time-series for cohorts as far back as 1920. The fraction of college educated women who are employed and report being teachers by cohort is similar when measured at earlier ages.

² Many districts had marriage bars that banned married women from working. For more information, see Goldin (1991a, 1991b and 2006).

³ In contrast to the pensions systems available to most policemen and firefighters at the time, which were operated by municipalities, most teachers participated in statewide pension plans.

Pensions generally take one of two forms: defined benefit or defined contribution. In a traditional defined benefit pension plan, upon retirement the employee receives a set benefit for life; the benefit size is determined by age, time spent with the employer and earnings history while employed. In 2013, teachers in 44 states participated in either a traditional (39 states) or hybrid (5 states) defined benefit pension system. In a defined contribution pension plan, employer and employee contributions are made throughout the employee's tenure with the firm and employees choose among investment options for the contributions. In 2013, only one state, Alaska, offered teachers a defined contribution plan. In the remaining five states, public school teachers had a choice of participating in a defined benefit plan, defined contribution plan or some combination thereof.

Therefore, an overwhelming majority of public school teachers in the U.S. participate in some form of defined benefit pension program. It is important to note that the current widespread use of defined benefit pensions is unique to employers in the public sector. In 2006, 65 percent of older workers in the public sector participated in some form of defined benefit plan, while only 39 percent of private sector workers did (Gustman et al. 2010). Moreover, while only 22 percent of private sector workers participate in only a defined benefit plan, the same is true of 57 percent of public sector workers.⁴

Although relatively few people in the private sector have access to a defined benefit pension, nearly all private sector workers are covered by Social Security, which is itself a type of defined benefit pension. Teachers in many states also participate in Social Security, although that was not always the case. Starting in 1954, the Social Security Act was amended to allow

⁴ The shift towards defined contribution plans in the private sector began in the 1980s. Potential causes include the introduction of 401(k) defined contribution plans, a shift in private sector employment away from heavily unionized industries, and the increased funding requirements for private sector pension plans.

Social Security program participation of state and local government employees who were members of a public retirement system. Public employees in a state can gain membership in Social Security by majority vote of the employees. In 35 states, such votes were passed and all teachers participate in Social Security; in another 3 states teachers in some of the districts participate in Social Security. Estimates suggest that between 61 and 73 percent of teachers participate in Social Security (Doherty et al. 2012).

The Structure of Teacher Pensions

Why might the type of pension plan influence labor supply at older ages? One defining characteristic of defined benefit pension plans is their set of clearly defined rules governing eligibility for benefit collection and benefit size. Moreover, the rules are often structured such that past a certain point an employee's return to continued employment is actually negative. These rules often lead to large discrete changes in the return to employees of retiring at a particular age or point in their careers. This is in stark contrast to defined contribution pensions where an employee can begin collecting benefits at almost any time and the present value of the pension wealth in defined contributions increases steadily with contributions (and oscillates only with market fluctuations). FN RE: WITHDRAW. Because there are no eligibility-rule induced discrete changes in the present value of defined contribution pension accounts at specific ages or points in one's career, there are no clear incentives to retire at a particular age or level of experience.

However, even employees in the U.S. without defined benefit pensions from their employer still participate Social Security. The earliest age of retirement in Social Security is 62

and full retirement age ranges from 65 to 67 depending on one's birth cohort. As with any defined benefit pension system, these eligibility ages are influential in the decision making of older Americans. About 40 percent of Social Security recipients begin collecting benefits at age 62 and another 10 percent begin collection at the full retirement age.⁵ At issue is how these incentives to retire at certain ages in Social Security compare with those in the defined benefit pensions provided to public school teachers.

Rules regarding eligibility for benefit collection in defined benefit pension plans for teachers are based on age, years of service within the public school retirement system, or some combination thereof. For example, in California, teachers who have vested in the system can retire at age 55. Teachers in the New York State pension system may retire with 35 years of service regardless of their age.⁶ Still many other states use the combination of age and years of service. For example, in the Texas Teachers' Retirement System, eligibility is determined by the rule of 80: any combination of age and years of service totaling at least eighty makes someone eligible to begin collecting retirement benefits as long as the employee is at least age 60.⁷

Traditionally, eligibility rules in public sector defined benefit pensions have been structured such that employees can retire much earlier than they would be eligible in the Social Security system. In Figure 3, I present information on the earliest retirement age at which a teacher who started working at age 22 and works continuously throughout her career becomes

⁵ Based on my calculations using data on claiming from the Social Security Administration.

⁶ Tier I members (those that started before 1973) of the New York State Teachers' Retirement System can begin collecting benefits with 35 years of service at any age. They can also collect benefits at age 55 with at least five years of service. The rules have changed over time and teachers entering New York state public schools since 2010 are eligible to receive benefits at age 55 with 10 years of service. (<https://www.nystrs.org/Benefits/Service-Retirement>, Accessed August 12, 2015)

⁷ If she entered the Texas Teacher Retirement System for the first time after 2014, the member must have at least 80 years of combined age and experience and be at least 62.

eligible for an unreduced retirement benefit. The figure shows that the age of retirement eligibility for career teachers ranges from 47 to 67. The bulk of states (34) have retirement eligibility ages between 52 and 60.

Recall that the traditional full retirement age in Social Security was 65; recently, changes increased it. In comparison, only 3 states systems have pension eligibility rules for teachers that would preclude them from retiring by age 65. None have rules that would prevent retirement by age 67. As such, many teachers can retire with an unreduced pension benefit earlier than their counterparts whose only access to a defined benefit pension is through Social Security.

The information in Figure 3 is about eligibility for an unreduced retirement benefit, also called a normal retirement benefit. Just as participants in Social Security can retire at age 62 with a discounted benefit, teachers in many state pension systems can retire even earlier if they are willing to accept a reduction in their annual benefit. The size of the reduction is based on how early the worker claims benefits. This is known as an early retirement option or early retirement benefit.

For example, if a teacher in Texas satisfies the rule of 80 requirement, but is not yet 60 years of age, she can retire, but her benefit will be reduced by five percent for each year she is younger than age 60. In other words, the Texas teacher who started teaching at age 22 and worked continuously is eligible for a normal retirement benefit at age 60. She can retire at age 51 (with 29 years of service) with a benefit that is just 55 percent of what her normal benefit would have been, at 52 with a benefit 60 percent as large, and so on. Almost all state pensions systems (46) have an early retirement option for teachers.

The size of one's annual retirement benefit in a defined benefit plan is generally determined by her number of years of service and some measure of her final average salary. To be specific, the annual annuity, B , is defined by the formula: $B = F \times \text{YearsofService} \times \text{FinalAverageSalary}$, where F is known as the benefit factor. Benefit factors in teaching are generally between 1 and 2 percent per year of service. The final average salary is one's salary in the final year or last few years of her career. Typically, there is a maximum benefit allowable. For example, in Illinois, the maximum benefit payable to a retiree is 75 percent of her final average salary, which is the average of her highest consecutive four years of salary in her last 10 years of employment.

The combination of these eligibility and benefit rules lead to changes in accrued pension wealth that lead to very clear incentives to retire at certain points. The present value of benefits increases discontinuously when a worker reaches early retirement eligibility. This makes early retirement eligibility a popular time for teacher retirement. Pension wealth then continues increasing at a relatively fast rate (as compared to earlier in one's career) until the teacher hits the normal retirement age. At this point, the present value of pension wealth may still increase with time on the job, but it will do so more slowly than it did between early and normal retirement eligibility. Eventually, when the employee hits the point where she will receive the maximum benefit or her wages are increasing slowly, her pension wealth accrual with an additional year of employment actually begins *decreasing*. This is because, despite the increase in the salary used to calculate benefits, by continuing employment she does not receive some of the benefit payments that she would if she retired.

That these rules have a large effect on teacher retirement behavior has been well-documented in the literature. For example, Harris and Adams (2007) calculated that nationally,

in 2005, 54 percent of the teachers first reaching early retirement eligibility took that option. Another three-quarters of teachers who reach normal retirement age began collecting benefits at that point. Other researchers have used state administrative data to show that pension eligibility leads to similar increases in retirement (Brown 2013; Mahler 2014; Koedel et al, 2014). For example, in Missouri, the median retirement age is 57 (Koedel et al. 2014).

Finally, in addition to pensions, there is one other notable piece of retirement-related compensation available for former public school teachers (and other public sector workers) that is not as widely available for workers in the private sector: retiree health insurance. As of 2009, every state offered some form of retiree health insurance to its government employees, including teachers (Clark and Morrill 2010). These state-sponsored retiree health insurance programs provide subsidized health insurance to retired teachers. These retiree health insurance programs therefore offer employees health insurance that is not contingent upon employment at earlier ages than most people can receive it from the federal government (generally at age 65, through Medicare). Research has shown that the offer of retiree health insurance leads public school teachers to retire earlier than they would have otherwise (Fitzpatrick 2014).

Evidence from the Health and Retirement Study

The existing literature, therefore, clearly illustrates that teachers leave their main jobs as teachers when they reach retirement eligibility. While informative, this does not give us a complete understanding of the labor supply of teachers, or of how it compares to other college-educated women. This is, in part, because teachers can continue to work even after collecting retirement benefits from their pension system. Most existing research on teachers' retirement

uses administrative data from teacher pension systems. Although such data offers large sample sizes, these data do not include information on labor supply outside of a particular teachers' retirement system. Continued work that would not be observed in an administrative data could include continued teaching for another school system or employment in another occupation or sector entirely.

To create a more comprehensive picture of the labor supply of teachers as compared to other college educated women at older ages, I turn to the Health and Retirement Study. The Health and Retirement Study is a nationally representative survey of Americans over the age of 50. The survey began in 1992 with a group of respondents aged 51 to 61 and continued interviewing them every two years. Since then, samples of older Americans have been added such that the study now represents all Americans 51 and older. For this study, I include information on the birth cohorts born between 1931 and 1950, women whom I can observe at ages 60 to 64. Because of the relatively small sample sizes, I present information for the following groups of cohorts: 1931 to 1935, 1936 to 1940, 1941 to 1945 and 1946 to 1950. I limit the sample to women who report having obtained a Bachelor's degree.

Just as in the CPS, the HRS data show evidence of a shift in the occupations of college educated women (Figure 4). While over 45 percent of the college educated women born between 1931 and 1940 were employed as teachers at some point in their work-lives, just 31 percent of those born between 1946 to 1950 report having been employed as teachers.⁸ Over this

⁸ The HRS asks information about occupation and pensions for the jobs about which it collects information. This includes jobs held at the time of each survey, the last job held and as well as up to three previous jobs if they were held for at least 5 years.

twenty year span of birth cohorts, there was a 30 percent decline in the fraction of college educated women who spent time employed as teachers.

Teachers do not experience the same increases in labor force participation at older ages that other college educated women do, particularly other women in the same category of managerial and professional specialization occupations (Figure 5). The employment of teachers increased from 53 to 59 for the 1931 to 1935 and the 1946 to 1950 cohorts, respectively, an increase of 6 percentage points. This is only slightly over half as large as the increase in employment of other college educated women in these cohorts, which was 11 percentage points. The employment rate of college educated women in the managerial and professional specialty occupations increased by nearly 20 percentage points across the same cohorts. As compared to the women in these similarly professionalized occupations, the increase in employment of teachers was just 30 percent as large. This suggests there may be at least some role for the difference in occupational choices across cohorts to have played a role in the longer work-lives of college educated women.

Although in the early cohorts, teachers were just as likely to be working between the ages of 60 and 64 as other college educated women, for women in the cohorts born between 1946 and 1950 that is no longer the case (Figure 5). Instead, teachers in the more recent cohorts are about 10 percent (6 percentage points) less likely to be employed at ages 60 to 64 than the rest of their college educated peers. The difference in employment rates is even starker when compared to other women in managerial and professional specialization occupations. 77 percent of the college educated women born between 1946 and 1950 who worked in the broader managerial and professional specialization occupations were employed at ages 60 to 64. In other words, the employment rate of other college educated women in occupations similar to teaching is 30

percent (18 percentage points) higher. Relatedly, the fraction of professional service occupation women who say they've retired has gone down by 11 percentage points (over 30 percent), but the fraction of former teachers who say they're retired has increased by about 2 percent (Figure 6).

Interestingly, the pattern of differences in labor supply across teachers and other college educated women does not extend pension and Social Security benefit collection. As can be seen in Figure 7, the fraction of teachers collecting pension benefits between ages 60 and 64 declined from 37 percent for those born between 1931 and 1935 to 21 percent for those born between 1946 to 1950. The collection of employer provided pension benefits by other college educated women fell by just 10 percentage points, from 20 to 10 percent. Although a smaller absolute decline, the decrease in pension receipt for women who have never been is teachers larger in relative terms (50 percent as compared to 43 percent).

Social Security benefit collection by older women who were not teachers also went down across these cohorts from 23 percent for those born between 1931 and 1935 to 17 percent for those born between 1946 and 1950. For the same cohorts of teachers, the fraction collecting Social Security benefits declined from 23 percent to 21 percent. Despite this small difference, the declines in receipt of any pension income (through either and employer provided pension or Social Security benefit collection) declined by the same absolute amount (12 percentage points) for teachers and those college educated women who were not teachers. However, this represented a 33 percent decline for the non-teachers and only a 26 percent decline for teachers.

Concurrent Employment and Pension Collection

TO BE ADDED.

Teachers or Public Sector Workers?

While many women are employed as teachers, teachers are not the only employees with employer-provided defined benefit pension that incentivize early retirement. The most obvious group of other employees with defined benefit pensions are other public sector workers. The labor supply of college-educated women ages 60 to 64 who worked in the public sector has increased by 5 percentage points across the cohorts born between 1931 to 1935 and 1946 to 1950. As such, as might be expected, these public sector workers did not experience the same increases in older-age employment as their counterparts in the private sector. However, the relative size of this group of government employees who are not teachers has changed little over these cohorts. Government employees make up about 30 percent of college educated women throughout these cohorts. As such, on its own, the behavior of college educated women in non-teaching jobs can offer little explanation for the changing retirement patterns of older college educated women in the U.S.

Evidence from a State-Level Analysis

To find further support for the hypothesis of a link between the declining prominence of the teaching profession among college educated women and the women's longer work-lives, I now turn to state-level analysis. In these analyses I look for an association between the fraction of a cohort of college educated women that are employed as teachers in a state at ages 46 to 50 and the employment of those women when they are ages 60 to 64. These analyses make use of the Current Population Survey from 1970 to 2010. I conduct the analyses separately for the set of states in which teachers do and do not participate in Social Security. Teachers that participate

in Social Security may not be as likely to retire in their early sixties as those whose only pension wealth comes from an employer-provided defined benefit pension with an earlier eligibility age.

First, I look for support for the hypothesis that teachers have more access to employer-provided pensions (columns 1 and 3 of Table 1). Indeed, when more women are teachers, more college educated women have employer provided pensions. In fact, a ten percentage point increase in the fraction of a cohort that is employed in teaching is related to a 3 percentage point increase in the fraction of a cohort that has an employer provided pension at the same ages. The effect is similar in states where teachers do and do not participate in Social Security.

In the second column of Table 1, the results suggest that, in states where teachers participate in Social Security, the propensity of college educated women who are teachers at ages 46 to 50 is not related to the probability of these women being employed between the ages of 60 and 64. In states where teachers do not participate in Social Security, however, there is a negative and statistically significant relationship between the fraction of college educated women employed as teachers at ages 46 to 50 and the employment of 60 to 64 year old college educated women (column 4, Table 1). This suggests that the incentives inherent in teachers' defined benefit pensions may lead them to retire earlier when they do not also have access to Social Security.

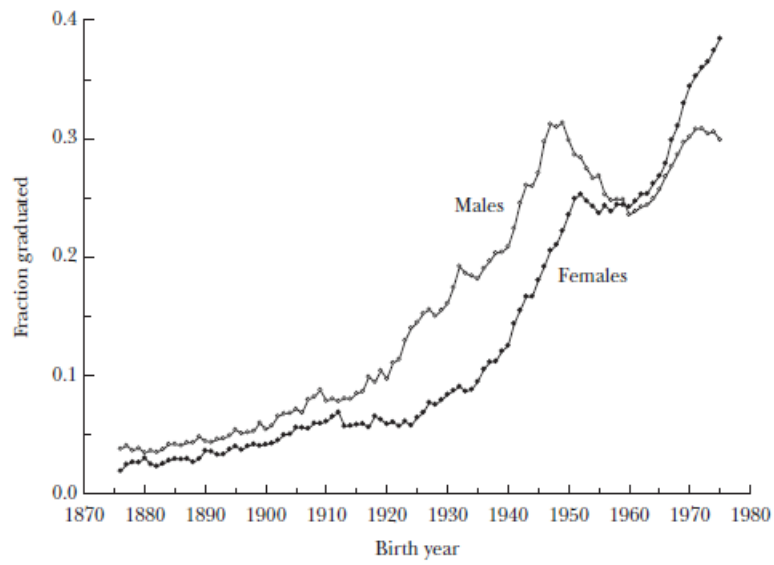
Conclusion

TO BE ADDED.

References

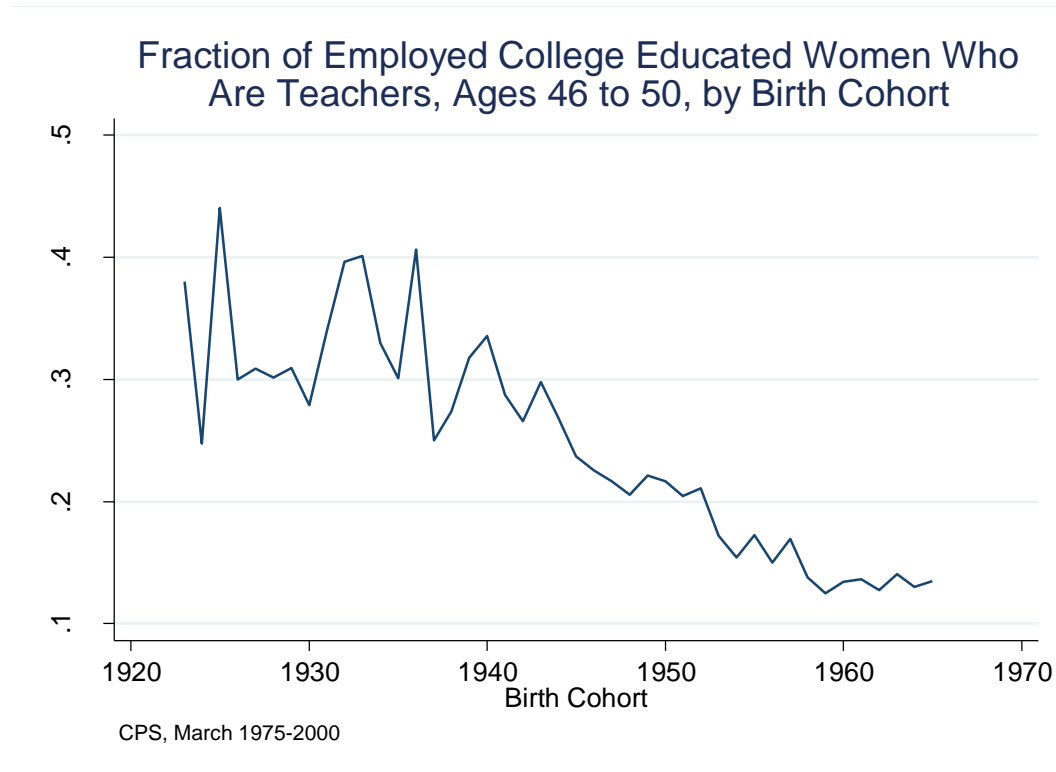
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Figure 1. College Graduation Rates (by 3) years for Men and Women: Cohorts Born from 1876 to 1975



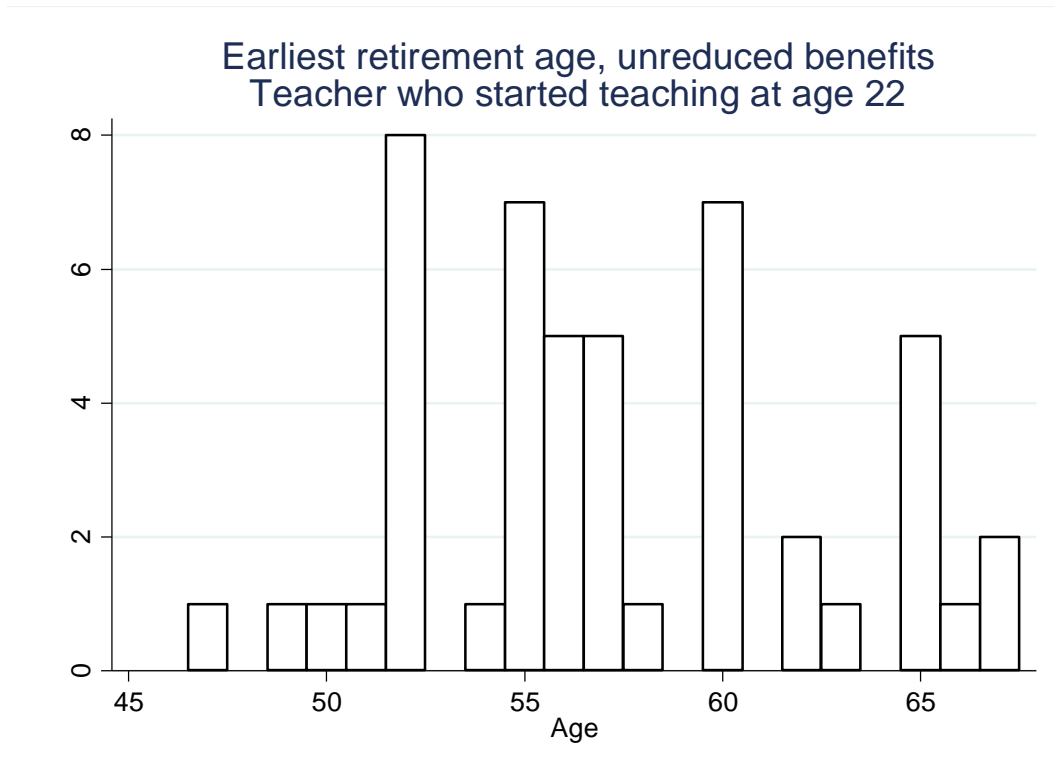
Source: Goldin, Katz and Kuziemko, 2006.

Figure 2. Occupations of Employed College-Educated Women, by Birth Cohort



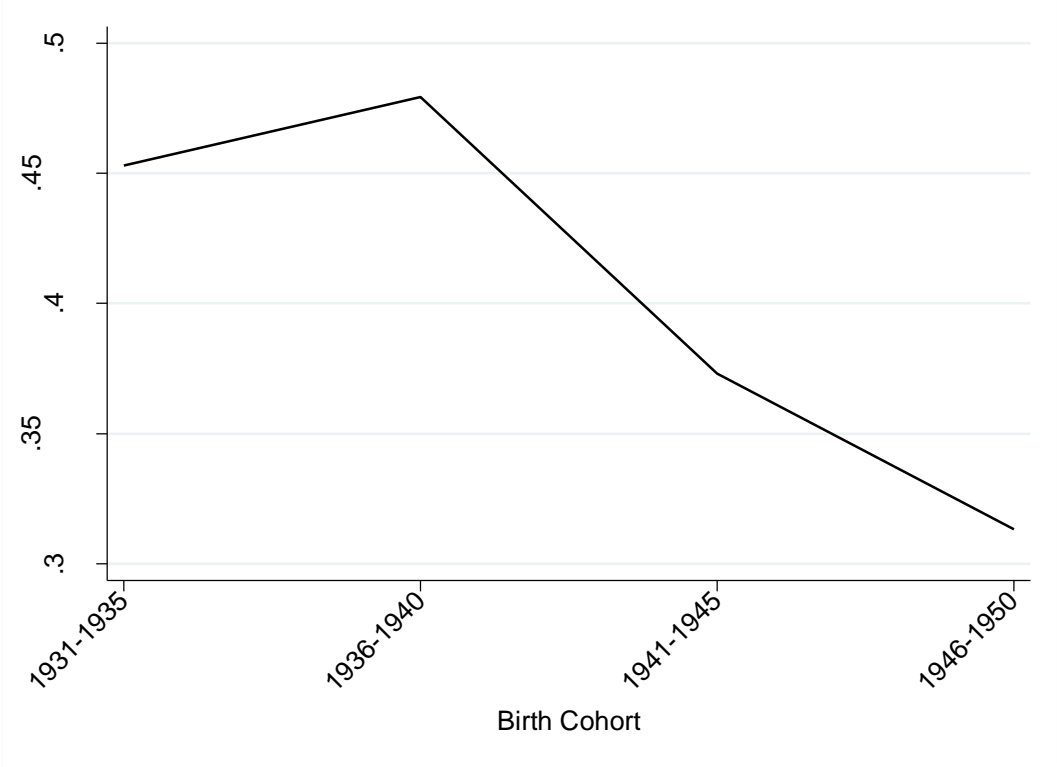
Note: Based on the author's calculations using the Current Population Survey, 1975 to 2000. Sample includes employed college educated women ages 46 to 50. FIX TITLE.

Figure 3. Normal Retirement Ages for State Teacher Pensions Systems



Source: Dougherty et al. 2012.

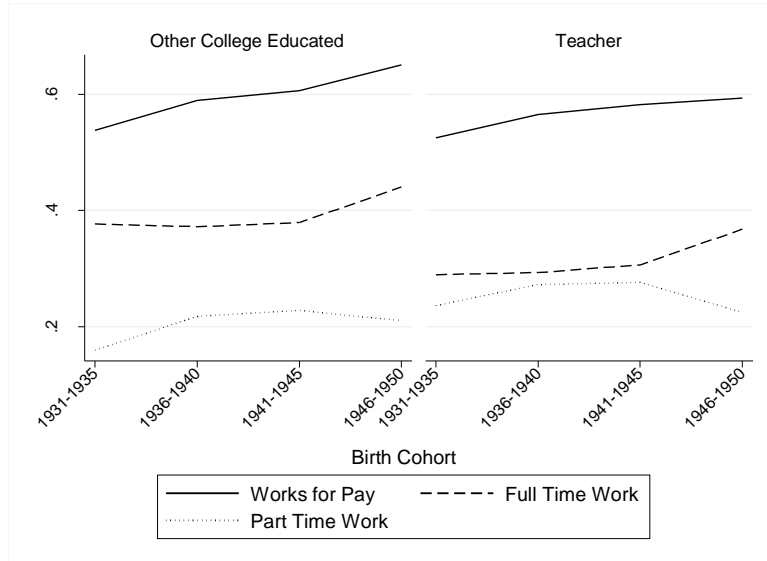
Figure 4. Fraction of College-Educated Women Ages 60 to 64 in the Health and Retirement Study Reporting Having Ever Been Employed As a Teacher, by Birth Cohort



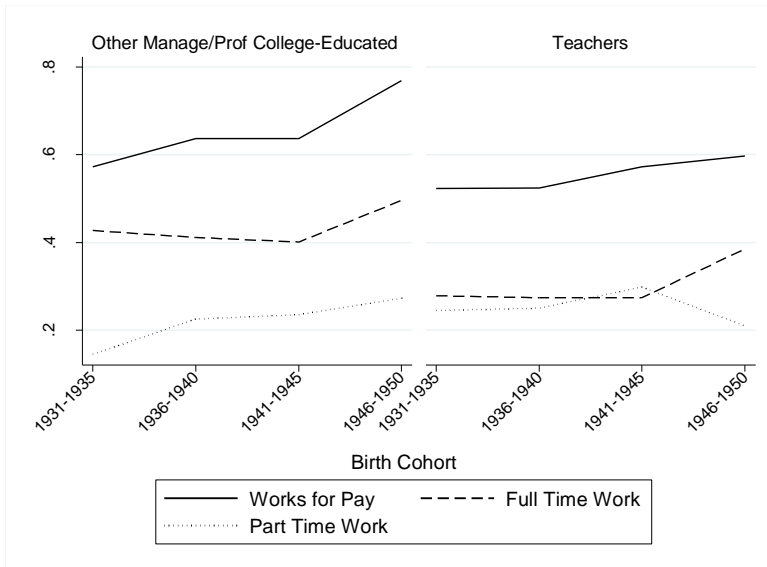
Note: Based on the author’s calculations using the Health and Retirement Study. Respondents were asked the type of work done at each job about which they were surveyed (current, last and previous). A woman is classified as a teacher if the occupation recorded was teaching for any of these jobs. The sample includes all college-educated women between the ages of 60 and 64.

Figure 5. Fraction of College Educated Women Ages 60 to 64 Employed, by Occupation and Birth Cohort

Panel A. Teachers versus other college educated women



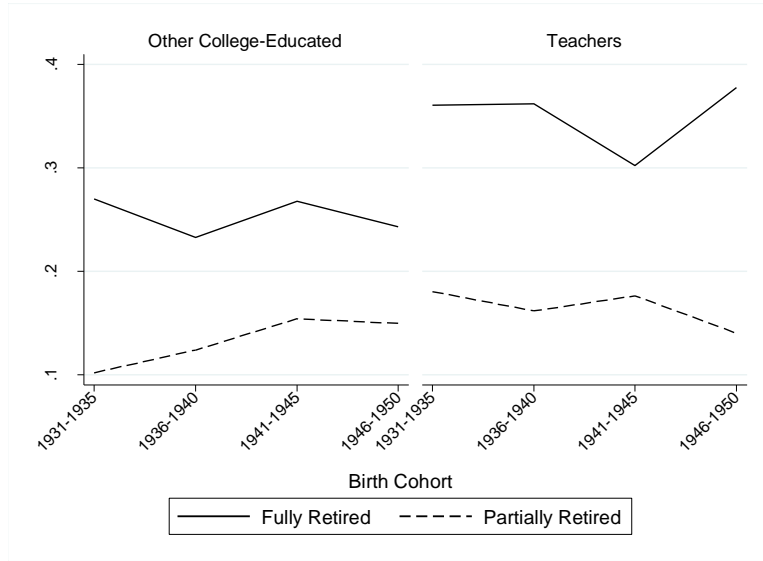
Panel B. Teachers versus other college educated women in managerial and professional specialization occupations



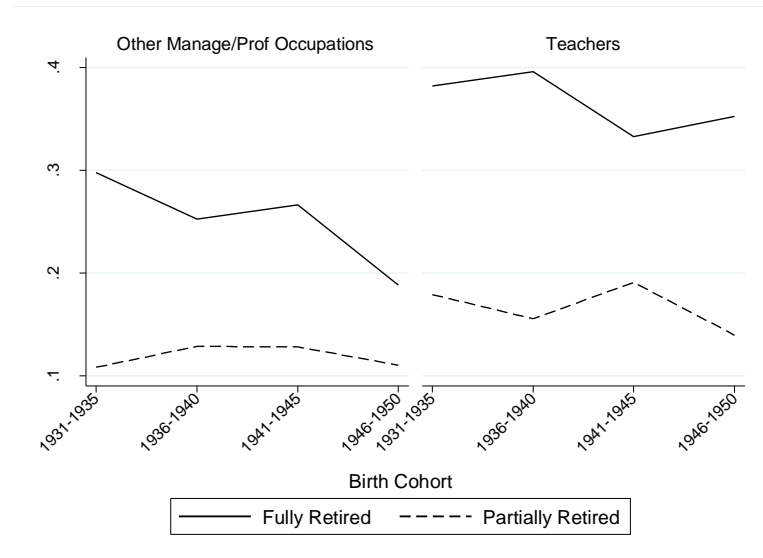
Note: Based on the author's calculation using the Health and Retirement Study. Respondents were asked the type of work done at each job about which they were surveyed (current, last and previous). A woman is classified as a teacher if the occupation recorded was teaching for any of these jobs. Women were classified into the managerial and professional specialty occupations using similar methodology. The sample includes all college-educated women between the ages of 60 and 64.

Figure 6. Fraction of College Educated Women Ages 60 to 64 Retired, by Occupation and Birth Cohort

Panel A. Teachers versus other college educated women



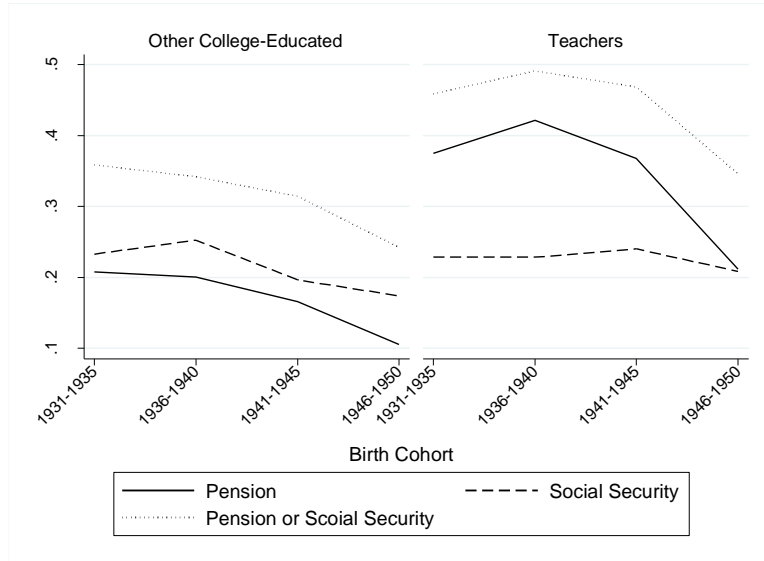
Panel B. Teachers versus other college educated women in managerial and professional specialization occupations



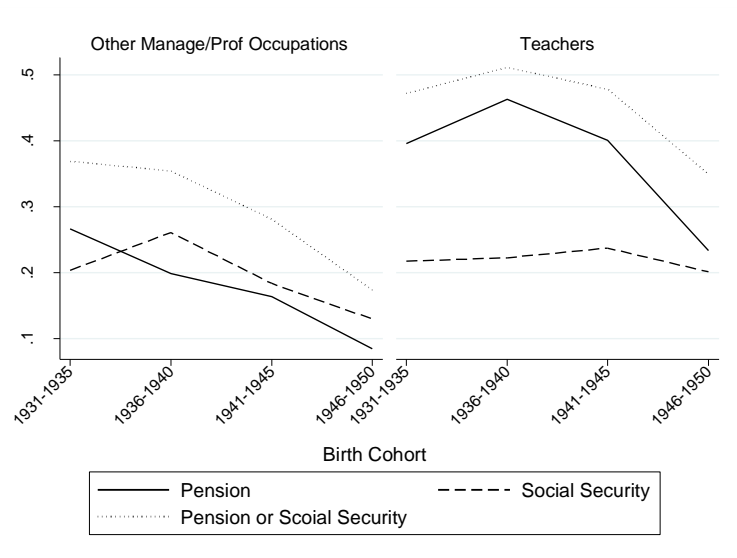
Note: Based on the author's calculation using the Health and Retirement Study. Respondents were asked the type of work done at each job about which they were surveyed (current, last and previous). A woman is classified as a teacher if the occupation recorded was teaching for any of these jobs. Women were classified into the managerial and professional specialty occupations using similar methodology. The sample includes all college-educated women between the ages of 60 and 64.

Figure 7. Fraction of College Educated Women Ages 60 to 64 Collecting Employer Pensions and Social Security Benefits, by Occupation and Birth Cohort

Panel A. Teachers versus other college educated women

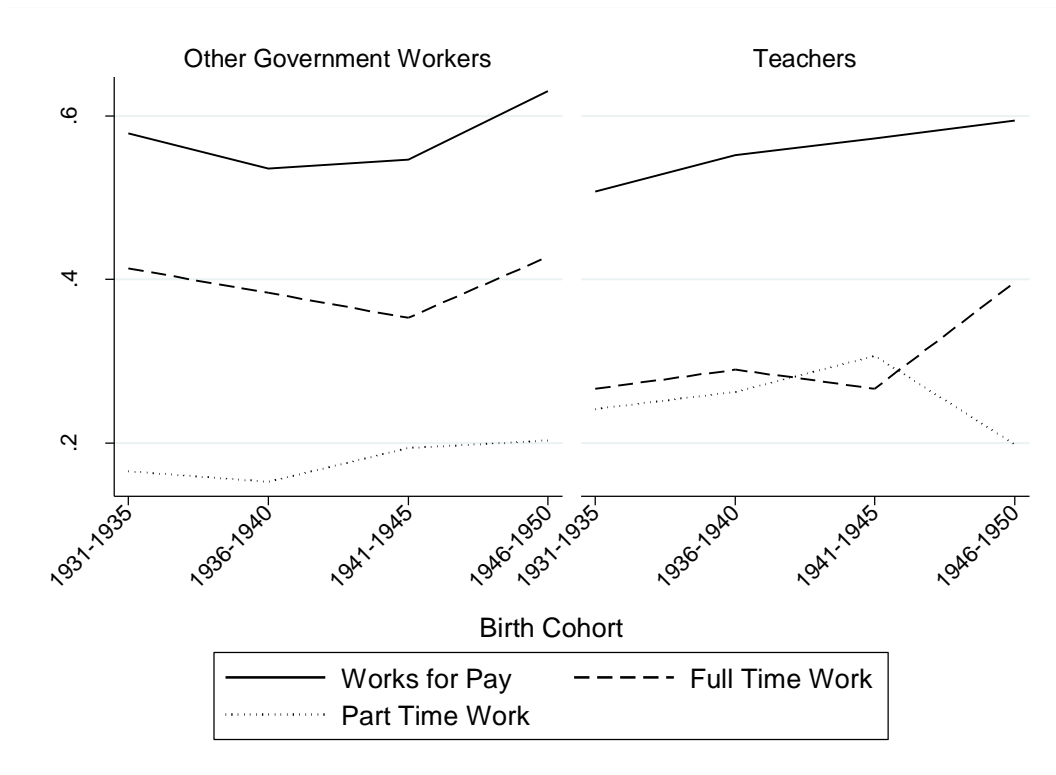


Panel B. Teachers versus other college educated women in managerial and professional specialization occupations



Note: Based on the author's calculation using the Health and Retirement Study. Respondents were asked the type of work done at each job about which they were surveyed (current, last and previous). A woman is classified as a teacher if the occupation recorded was teaching for any of these jobs. Women were classified into the managerial and professional specialty occupations using similar methodology. The sample includes all college-educated women between the ages of 60 and 64. Pension and Social Security benefit collection is determined by whether a respondent reports any income from an employer-provided pension or Social Security, respectively.

Figure 8. Fraction of College Educated Women Ages 60 to 64 Employed, by Occupation and Birth Cohort



Note: Based on the author's calculation using the Health and Retirement Study. Respondents were asked the type of work done at each job about which they were surveyed (current, last and previous). A woman is classified as a teacher if the occupation recorded was teaching for any of these jobs. Women were classified into the managerial and professional specialty occupations using similar methodology. The sample includes all college-educated women between the ages of 60 and 64.

Table 1. State-Level Analyses of the Link Between the Fraction of a Cohort that is Employed as Teachers and the Fraction that Are Working Later in Life.

| | (1) | (2) | (3) | (4) |
|----------------------|--|----------------------------|---|----------------------------|
| | Pension on Job, Ages 46 to 50 | Employed, Ages 60 to 64 | Pension on Job, Ages 46 to 50 | Employed, Ages 60 to 64 |
| Fraction Teachers | 0.287*** | 0.011 | 0.319*** | -0.115** |
| | (0.036) | (0.030) | (0.052) | (0.051) |
| Sample | Only states where teachers participate in Social Security | | Only states where teachers do not participate in Social Security | |
| Observations | 647 | | 280 | |

Note: Based on author's calculations using the Current Population Survey. Sample includes college-educated women born between 1931 and 1950. The data are at the state-cohort level. The dependent variables of interest are (i) whether employees between the ages of 46 and 50 have access to an employer provided pension and (ii) whether women between the ages of 60 and 64 are working. The independent variable of interest is the fraction of college educated women in a state between the ages of 46 and 50 who are employed as teachers and state and cohort fixed effects are also included.