Essays in Labor Economics

by

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DISSERTATION ABSTRACT

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In Chapter 1, I exploit a policy change for U.S. federal workers' pension benefits to estimate the effect of pension generosity on worker retirement, retention and recruitment. The policy increased pensions by 16%-25% or approximately $111,000. There is a 30% decrease in job quits for permanent workers. However, there is little evidence that pension generosity has an effect on new hires. This suggests salience may play a role in how workers value pensions. Additionally, I find a large heterogeneous labor supply response to pension generosity. Altogether, this shows that pension generosity is effective in retaining workers and may have important implications for workforce planning.

In Chapter 2, I estimate a structural model of retirement that incorporates anticipatory labor responses. Under a naive model that assumes workers do not respond to financial incentives, fiscal costs will be underestimated. When workers dynamically respond to pension incentives, they delay their retirement to maximize their pension value which leads to higher fiscal costs. I estimate that, when not accounting for dynamic labor responses, fiscal costs will be underestimated by 8%to 20%. Altogether, policymakers intending to decrease public pension generosity may underestimate the fiscal costs without modeling anticipatory labor responses.

Chapter 3 studies the effect of disability-based affirmative action on the federal workforce. We provide descriptive evidence there is an increase in representation of workers with disabilities. However, we find that this increase is relatively larger for less severe disabilities compared to more severe disabilities. Additionally, we find evidence there is a decrease in representation among agencies that satisfy the mandate. The results suggest that severity of disability may need to be considered when mandating disability-based affirmative action.

This dissertation includes unpublished coauthored material.

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CHAPTER I

RETIREMENT, RETENTION, RECRUITMENT: EVIDENCE FROM A FEDERAL PENSION POLICY

This dissertation includes both unpublished co-authored material and solo-authored material. Chapter 1 and 2 are solo-authored material. Chapter 3 includes material that is co-authored with Glen Waddell: we both contributed to the writing and statistical analysis of the manuscript.

1.1 Introduction

In October of 2009, the "Non-Foreign Area Retirement Equity Assurance Act" (NFAREAA) was enacted. Under this policy, pension benefits increased by approximately 14% to 25% for federal workers in non-foreign areas (such as Alaska or Hawaii).[1] The goal of this policy was threefold: to increase worker retention, attract higher quality workers, and provide equity for retiring workers in higher cost locations. This policy provides valuable perspective given current concerns about public pension funding. In 2009, state pensions were estimated to be underfunded by three trillion dollars collectively (Novy-Marx & Rauh, 2009). This has worsened as the bottom third of public pension plans will be insolvent without major change (Aubry, Crawford, & Wandrei, 2018). Some states have already legislated to reduce pension annuities due to budgetary concerns (Munnell, Aubry, & Cafarelli, 2016). Policymakers will need to balance the maintenance of a public workforce with funding challenges. This suggests that variation in pension generosity stemming from the roll out of NFAREAA can provide needed insight on the role of pensions in the public labor market.

[1]Note: non-foreign areas are a part of the United States, but outside of the contiguous United States.

In this paper, I study the impact of NFAREAA on public worker labor outcomes in Alaska and Hawaii using an event study. The policy led to a pension increase between $96,000 to $126,000 for the average retiring worker. I find that increased pension generosity has little impact on the average service years of a worker. This aligns with previous literature and may be due to age constraints imposed by various policy. However, for older workers and low-wage workers I find heterogeneous responses. Workers above the age of 65 decrease their labor supply by approximately 2.9 years while low-wage workers increase their labor supply by 2.35 years. The elasticities of lifetime of labor supply with respect to net wages for these workers are -0.91 and 0.99 for older workers and low-wage workers respectively. Previous literature finds estimates to be close to zero for the average worker–less is known about the distribution of responses. The elasticities I find in this paper provide insights for effective workforce planning. Moreover, I provide evidence that increased pension generosity decreases the quit rate of permanent workers by 30%. This suggests that pension policy is an effective tool for retaining workers with the highest amount of human capital. Last, I find no evidence that more generous pensions attract workers. This suggests that policy providing more generous pensions will have small effects on recruitment. These last two findings suggest that there may be an asymmetry in how workers value pensions. This may be that workers outside of the federal government are not salient of pension quality while workers within are. Given this, agencies may need to consider alternative forms of compensation if their goal is to recruit more effectively. As a whole, these findings contribute to the literature by understanding the role of pensions on the public workforce.

Previous literature suggests that a more generous benefit package induces a wealth effect which, in turn, causes an earlier retirement (Blundell, French, & Tetlow, 2016). While theory informs the negative relationship between labor and pension generosity, measuring the magnitude of this effect has been difficult. Previous research has used structural models to estimate the relationship.[2] Recent research has started to use natural experiments to estimate this elasticity. Krueger and Pischke (1992) and Snyder and Evans (2006) both study a "notched" set of workers who received lower Social Security benefits. These two papers find differing effects: Krueger and Pischke (1992) finds no evidence of disemployment with higher benefit generosity whereas Snyder and Evans (2006) finds large disemployment effects. More recently, Brown (2013) uses a policy change that affected retirement benefits for school teachers in the state of California. Brown (2013) finds the policy had small effects with an elasticity of about 0.04, which implies that workers will adjust their retirement date by less than two months for an increase of 10% in compensation. Another paper with similar results is Manoli and Weber (2016). Manoli and Weber (2016) finds that almost no worker would delay retirement by 1.25 years for an increase of 25% in total retirement benefits. In this paper, I provide evidence by using a direct exogenous shock to pension benefits for all federal workers. Workers receive between 14%-25% higher pension benefits conditional on working for three or more consecutive years. I contribute to this literature by reaffirming previous research in a diverse setting, showing there is a small elasticity of labor supply with respect to wealth shocks. However, I find a larger range of responses that have not been captured in previous literature

[2]For early structural work see Rust (1989), Stock and Wise (1990) and Gustman and Steinmeier (1986). More recently, French (2005) and French and Jones (2011)

highlighting that effective policy will need to account for heterogeneity when workforce planning.

There is a mixed literature of the effect of pension generosity on worker retention. Lazear (1990) suggests that defined benefits pension programs are a form of strategic compensation to increase labor retention. Structural models have estimated this relationship and find modest effects.[3] Recently, natural experiments have been used to estimate this relationship. Quinby and Wettstein (2021) studies a large pension cut that reduces total present value for Rhode Island public workers by 43%. Quinby and Wettstein (2021) finds that there is a 2.4%, or 12% increase from baseline, in separations as a result of the pension cut. Quinby and Wettstein (2021) suggests the low elasticity could be due several reasons: workers may not highly value pensions; workers have intrinsic motivation for public service; and/or workers are imperfect substitutes within the labor market. Koedel and Xiang (2017) studies an increase in pension generosity for teachers in St. Louis. Koedel and Xiang (2017) finds no effect of pension generosity on retention. These recent papers call into question the strategic compensation theory proposed in Lazear (1990). If pension generosity is not effective in retaining workers, then there may be alternative compensation arrangements which could better retain workers. I contribute by showing that pensions have large implications on workers with the highest levels of human capital–permanent workers–while there is little effect on temporary workers. Without this distinction, I find a null effect on the overall workforce. This finding is contrary to recent literature and suggests that pension policy is effective for maintaining a public workforce.

[3]See Gustman and Steinmeier (1993); Dale-Olsen (2006); Frazis and Loewenstein (2013); Rabe (2007); Mitchell (1982)

The literature of pension generosity on worker recruitment has found null effects. Fitzpatrick (2015) finds that pension benefits are not highly valued when workers are deciding jobs. Krueger (1988) finds that changes in pension generosity do not increase job applications for federal positions. However, there exists anecdotal evidence that pensions attract workers, but may attract different types of workers. In this paper, I find no evidence that more generous pensions attract workers. This suggests that policy aimed at providing more generous pensions to recruit workers may have little impact.

The paper proceeds as follows. The second section of the paper provides background to the policy reform and introduces the data. The third section develops an econometric framework to understand how the policy impacted labor outcomes. The fourth section provides results on retention, retirement and recruitment. The fifth section concludes with policy implications and future areas of research.

1.2 Background

The Federal Employee Retirement System (FERS) and Civil Service Retirement System (CSRS) are, collectively, one of the largest pension systems in the U.S. and, more generally, in the world. These systems cover most federal workers and have $2 trillion dollars in actuarial liabilities.[4] [5] Workers entering the workforce prior to January 1, 1987 were automatically enrolled into CSRS. Individuals entering the workforce after that cutoff date were automatically enrolled into FERS. FERS has three major components: a FERS annuity (a defined benefit plan), Social Security, and a Thrift Savings Plan (an optional defined contribution

[4]Please see the following: link

[5]Most federal workers are covered by FERS with exceptions for specific agencies such as the Central Intelligence Agency, the Foreign Service, and all branches of the U.S. military.

plan with matched contributions). CSRS has only two major components: a CSRS annuity and a Thrift Savings Plan (an optional defined contribution plan with matched contributions). CSRS and FERS are financed by contributions from active workers to retired workers, with unfunded liabilities covered by the federal government. In general, the pension annuity is calculated using the participant's age, salary and service years.

Previous to NFAREAA, pension benefits for federal workers in non-foreign areas such as Alaska, Hawaii, or Guam was significantly lower than workers in the contiguous United States. This is because NFA workers received a COLA to compensate for higher prices. However, COLAs are non-taxable income and are not considered when calculating pension benefits. This meant, previous to the policy, workers in NFAs received similar wages to workers in the contiguous United States, but received disproportionately lower pension benefits. NFAREAA transitioned COLAs to locality pay for each non-foreign area over a three year period. Locality pay is taxable income and is considered when calculating pension benefits. As a result, pension benefits significantly increased as shown in Figure 1c. I provide an example of this in Figure 1a.

The formula used by the Office of Personnel Management (OPM) to calculate pensions for FERS is as follows:

$$\text{Pension} = \begin{cases} 1.1\% \times \text{High-3 Average Salary} \times \text{SY}, & \text{if age} > 62 \text{ and SY} > 20 \\ 1\% \times \text{High-3 Average Salary} \times \text{SY}, & \text{otherwise} \end{cases} \tag{1.1}$$

where

$$\text{High-3 Average Salary} = \max_{j} \frac{\sum_{t=j-2}^{j} \text{Salary}_t}{3} \tag{1.2}$$

and

$$\text{Salary} = \text{Base Pay} \times \text{Locality Pay Multiplier} \tag{1.3}$$

The formula used by the Office of Personnel Management (OPM) to calculate pensions for workers under CSRS is similar and is included in Appendix A.2. SY is service years which is the time spent working for the federal government. High-three average salary is the average of the highest three continuous years of taxable salary while working for the federal government. Since COLAs are non-taxable, they do not effect a worker's high-three average salary. This implies that switching COLAs to locality pay directly increased pension benefits by increasing a worker's taxable salary.[6] This is shown in Figure 1b. However, it is important to note that workers received a reduced COLA which offset the increase in locality pay, resulting in workers having the same after-tax take-home pay.[7] This is shown in Figure 1d. In addition, Appendix A.1 displays each NFA alongside the changes in full locality pay, payable locality pay, and COLA from 2009 to 2015.[8]

[6]For further explanation on how the high-three average salary is calculated, please see Appendix A.2.

[7]Workers feared losing wages due to the policy so the adjustments to COLA offset increases in locality pay to avoid this situation. Please see the following: link.

[8]Full locality pay is used for retirement calculations while payable locality pay is used for salary calculations. To ensure that wages did not change significantly, workers received a COLA and a payable locality pay for their wages. However the full locality pay was used to calculate a worker's pension annuity.

To be eligible for these benefits, workers must be above a certain age and/or above a specified number of service years. Federal workers can voluntarily retire under any one of the three conditions:[9]

1. if the worker is above the age of 62 and they have 5 years of service

2. if the worker is above the age of 60 and they have 20 years of service

3. if the worker is above a minimum retirement age and they have 30 years of service.[10]

To illustrate the change in pension benefits, consider workers in Alaska. Workers retiring post 2013 would have a 25% increase in pension benefits compared to workers prior to 2010 as shown in Figure 1c. For workers in Alaska and Hawaii, this increased pension annuities for the average worker by $6,000 or an average of 21%. All together, this demonstrates the quasi-experimental variation induced by the pension policy. The policy induced higher pension benefits for all workers residing in NFAs while all other states had no change in pension benefits. This provides an ideal setting to identify the impact of pension benefits on several labor outcomes.

1.3 Data

The data used in this analysis comes from the Office of Personnel Management (OPM) which collects data on federal workers for administration purposes (OPM, 2005). The data contains information on the federal civilian workforce and military. The data are at the worker-year level from 2005 to 2018

[9]For some occupations such as an air traffic controller, law enforcement, firefighter or military reserve technician or if the worker's federal agency has undergone a major change in function, workers can retire earlier than the age of 55.

[10]The minimum retirement age is dependent on the worker's year of birth, but is approximately 55 years old. Workers who retire prior to these thresholds are considered early retirees and receive diminished benefits. To be eligible for an early retirement, workers must be approximately 55 years old and have 10 years of service.

and provides detailed information on salary, education level, occupation, agency, age level, years of service and other variables. The data are repeated cross-sections for each year with no worker identifiers. Altogether, there are three datasets: the first provides a cross-section of all workers employed by the federal government; the second provides a cross-section of accessions into the federal government; and the last one provides a cross-section of separations out of the federal government. I provide additional summary statistics in Figure 2.

The federal workforce is an ideal setting to explore the impact on labor outcomes for several reasons. The federal data are rich, which provides opportunity to leverage heterogeneity such as the distinction between permanent and temporary workers. Further, the federal workforce is large, which affords the opportunity for precise estimates. In a given year, there are over 640,000 workers with approximately 40,000 separations and 30,000 accessions. Last, the policy impacted two states–Alaska and Hawaii–which provides an opportunity to find a common treatment effect.

In these results, I focus on non-military, permanent, full-time workers. This leaves 14,109,209 employments, 547,957 separations, and 433,151 accessions across time. I separate out the military because the policy did not impact military personnel. Further, due to a separate policy affecting the Department of Veterans Affairs in 2016, I remove them from the analysis.[11] Last, I remove the Department of Homeland Security due to large restructuring in the agency and significant workforce size changes between 2004 and 2012.

[11] A policy in 2016 allowed individuals to take a phased retirement which induced workers to begin their retirement earlier. Please see VA Directive 5009/11.

1.4 Econometric Framework

Adopting notation from Clarke and Tapia-Schythe (2021), I use a standard event-study framework to identify the impact of the pension policy. Specifically the model used is:

$$Y_{s,t} = \alpha + \sum_{j=2}^{J} \beta_j (\text{Lag } j)_{s,t} + \sum_{k=1}^{K} \gamma_k (\text{Lead } k)_{s,t} + \mu_s + \lambda_t + X'_{s,t}\Gamma + \epsilon_{s,t} \tag{1.4}$$

for state s at time t where μ_s and λ_t are state and time fixed effects, $X_{s,t}$ are (optionally) time-varying controls, $Y_{s,t}$ is the outcome of interest, and $\epsilon_{s,t}$ is an unobserved error term. The policy was enacted in October 2009. Due to this, I use 2008 as the reference year. For this setting, I do not use time-varying controls and rely on state and time fixed effects. I cluster standard errors at the state level as in Cameron and Miller (2015). For the control group, I use all other states besides Alaska and Hawaii. For robustness, I include additional placebo tests in the Appendix A.15. These do not change results significantly. I use a similar framework for long term effects:

$$Y_{s,t} = \alpha + \gamma PostEvent_t \times Treatment_s + \mu_s + \lambda_t + X'_{s,t}\Gamma + \epsilon_{s,t} \tag{1.5}$$

The coefficient of interest is γ which identifies the impact of treatment in the long run. In this setting, the long run will be denoted as all years post 2013. I include years 2005 to 2008 as the relevant pre-treatment time period. The preferred specification for the outcome variable is logged counts of retirement. An alternative measure is the percentage of workforce retiring. This specification introduces variation due to workforce hiring and exits, which will lead to a noisier outcome

variable.[12] For regressions with logged outcome variables, when there are intervals with 0 counts I use the following instead: $log(x+1)$. I include all regression outputs for event studies in Appendix A.9 and regression outputs for heterogeneity figures in Appendix A.11-A.16.

1.5 Results

1.5.1 Net Wealth. I use a back-of-the-envelope calculation to measure the effect on an individual's net wealth. I make an assumption that, on average, individuals retiring will live to 80 which is the average life expectancy in the United States. To calculate the change in net wealth that individuals would receive if they had delayed their retirement, I do the following:

$$TotalPensionGrowth = (AverageLifespan - RetirementAge) \tag{1.6}$$

$$\times Pension \tag{1.7}$$

$$\times GenerosityMultiplier \tag{1.8}$$

The average retirement age is between 59 and 64.[13] As stated earlier, the average increase is $6,000. This is shown in Table 1. This means the average worker could expect an increase of $96,000 to $126,000 if they had delayed their retirement. To show the distribution of effects, I calculate the total pension growth using the set of Alaska workers that retired prior to the policy in 2007. There is

[12]Consider a large increase in the percent of the workforce retiring. This could be due to a high amount of retirees or a low number of workers in the workforce which can be problematic for inference.

[13]Note: the dataset does not provide numerical ages, it provides age bins. This means I impute what an individual's age is if they are above 65. From the Federal Reserve's Survey of Household Economics and Decisionmaking, 96% of workers retire by age 70. I impute the upper bound to be 70 for workers above the age of 65. Link for the dataset.

large variation in the shock, ranging from $10,000 to $400,000. This is shown in Figure 1f.

1.5.2 Net Wages. As mentioned previously, COLAs decrease and locality pay increases. As a result, taxable income increases. However, what is less certain is the change in post-tax income. The policy was specifically aimed to not change take home wages.[14] For robustness, I use TAXSIM35 from NBER to estimate the change in a worker's after tax pay. For pensions, I use the pension rate which is 0.8% prior to 2013, 3.3% from 2013 to 2014 and 4.1% from 2014 on as specified on by OPM. For marriage status, I assume that all workers are single filers since marriage status is not available in the dataset. Combined this allows me to estimate the tax liability for workers before and after the policy. I find that the average worker's post tax income changed by $231, as shown in Table 1. This shows that Alaska and Hawaii had no differential wages due to the policy as intended by policymakers and highlights that wages are not the main driver of behavior.

While take-home salary did not change, total compensation including pension benefits did. To understand the impact on benefits, I include the pension accrual in the total wages a worker receives.[15] I calculate the change in wage by using the following formula for FERS workers:

$$\frac{\Delta Wage}{Wage} = \frac{\Delta PensionAccrual}{Wage} \tag{1.9}$$

Since the change in salary is approximately 0, then

[14]Here is a link that shows the Congressional Budget Office's cost estimates. Note: "As a result, salaries would increase to maintain the take-home pay of affected employees."

[15]Note: This does not include valuation of health benefits, but this exercise is meant to create a lower bound. Adding health insurance will create a smaller change in wages.

$$\Delta PensionAccrual = PensionAccrual_{New} - PensionAccrual_{Old} \tag{1.10}$$

$$= PensionAccrual_{Old} \times GenerosityShock \tag{1.11}$$

$$= \delta \times Wage \times GenerosityShock \times (T - S) \tag{1.12}$$

where $(T - S)$ = Years of retirement.

$$\frac{\Delta PensionAccrual}{Wage} = \frac{\delta \times Wage \times GenerosityShock \times (T - S)}{Wage} \tag{1.13}$$

$$= \delta \times GenerosityShock \times (T - S) \tag{1.14}$$

To calculate an upper bound on the change in wages, I assume that $(T - S)$ or the total number of years in retirement is on average 20 years. Given that OPM defines δ to be 1.1% and *GenerosityShock* is approximately 1.16-1.25, the percent change in wages is between 3.5-5.5%. For CSRS workers, the shock is similar except δ is approximately 2% which means the percent change in wages is between approximately 7%-10%.

1.5.3 Retirement. Regarding workforce exits, a large majority of workers leaving are due to retirement, quitting or transferring. Approximately 6% of the workforce separates. Of that 6%, approximately 25% quit, 50% retire and 15% transfer within the federal government, and 10% being other categories. This can be seen in Figure 2d. While transferring is not necessarily costly, retirement and job quits can be costly to an agency. In this analysis, I focus on the long-run effects. Future research should explore the short run effects on retirement in detail. As shown in Figure 3a, workers are less responsive to pension changes in the long run compared to the short run. In Appendix A.9, I find no significant change in

the number of retirements yearly. Additionally, there is no significant effect on total service years at retirement. This can be seen in Figure 3b.

I separate the effect by age brackets and find that pension generosity had little effect on labor supply for 55-59 and 60-64 year olds.[16] This is shown in Figure 4a. However for workers above the age of 65, there is a 10% decrease in total service years. This represents a decrease in labor supply of approximately 2.9 years. For workers below the age of 64, it may be that age constraints on Social Security or Medicare access that prevents workers from retiring early. Additionally, I find that workers in the lowest quartile of wages increased their labor supply by approximately 10% which is approximately 2.35 years. This can be seen in Figure 4b. For workers in the lowest quartile of wages, it may be that the increased financial returns to working has increased labor supply. Workers now receive more in total wages for an additional year of service. These findings suggest that there are large heterogeneous responses to pension policy.

In the long run, this policy has little effect on the average labor supply of a worker. This is consistent with previous literature. However, there is evidence to show a large heterogenous response to this policy. For the oldest workers, I estimate the elasticity of lifetime of labor supply with respect to net wage to be approximately -0.91.[17] Further, workers in the lowest quartile of wages significantly increased their labor supply by approximately 2.35 years. This leads to an elasticity of approximately 0.99. In this paper, I find a larger range of elasticities suggesting that pension generosity has a small effect on the average worker, but the

[16]Note: the data is binned into age groups so individual ages are not readily available.

[17]To calculate this: I follow Brown (2013) and look at the percent change in service years with respect to the percent change in wages. I use an upper bound of 10% for the wage changes as shown in the earlier section. On average workers above the age of 65 worked 30 years.

distribution of responses is larger than previously found. Given these heterogeneous responses, policymakers will need to take workforce demographics into account when setting pension policy as it has significant effects on different populations.

1.5.4 Retention. I first test to see if there is a change in quits, which can be seen in Figure 3c. For permanent workers, I find a decrease of -30% in quits post policy.[18] This represents a decrease of 38 quits yearly in Alaska and 13 quits yearly in Hawaii. This shows that workers do consider pension benefits when deciding between quitting or staying in their current employment. For temporary workers, I do not find a significant change in separations which can be seen in Appendix A.14 in Figure A.14c and Figure A.14d. This shows that job quits depends on the type of employment: permanent workers are less likely to separate after the policy while temporary workers are not. This suggests that permanent workers are aware of their pension and consider it when deciding to leave their job. This result differs from recent literature, which finds a small effect of pensions on retention. This may be due to separating out the effect on permanent versus temporary workers. Without separating out the effect on permanent and temporary workers, I find a small non-significant effect of pension generosity on job quits of approximately 12%.

I create an elasticity using the change in job quits with respect to wages. This creates a lower bound for the elasticity of job quits to wage of approximately -6 to -8, showing that job quits are very responsive to wage changes. This is a relatively large elasticity that has not been found in the literature. Dale-Olsen (2006) uses observational evidence and finds that a 1% increase in fringe benefits leads to a 0.5% decrease in turnover. This suggests that agencies use pension

[18]I include placebo tests in Appendix A.15 and I find that the effect is significant at the 5% level.

benefits as strategic compensation to increase retention for workers with the highest capital accumulation (Lazear, 1990). While the marginal worker considering quitting the agency responds to pension generosity, it does not seem that the marginal worker considering transferring responds to pension generosity. This is shown in Figure 3d. It may be that there is a decrease in workers transferring out of Alaska or Hawaii, however the data cannot distinguish transfers across states from within state. It may be that most transfers are happening within Alaska and Hawaii and may explain the null result.

Further when separating out by service years, I find that the effect of pension generosity on job quits scales with service years as shown in Figure 4c. This is consistent with Lazear (1990), as workers with higher tenure are less likely to leave due to cliff vesting. More specifically, the effect of the policy reduced quits by approximately 23% for workers with 0-4 service years, approximately 39% for workers with 5-9 years, approximately 37% for workers with 10-14 years, 26% for workers with 15-19 years, and 6% for workers with 20 or more years. It is important to note that workers are eligible to retire after 20 years so this may explain why there is a null effect for workers with more service years.

I calculate that this policy led to a 32% decrease in total service years lost from job quits each year in Alaska and Hawaii. This is shown in Table 1. To put into perspective, I aggregate the effect across Hawaii and Alaska. This led to a decrease of 51 quits each year. Those workers collectively had a total of 450 service years and $1,209,000 in wages. This shows that pension generosity is an important factor to retain workers with the highest human capital which coincides with Becker's theory of general and specific training (Caire & Becker, 1967).

1.5.5 Recruitment. For workforce entries, there are two main types of accessions into the workforce: transfers and new hires. Summary statistics are shown in Figure 2. Transfers are individuals moving within the federal workforce across agencies or states. Approximately 80% of the individuals joining the federal government are new hires. Given that net compensation increased for workers, I test to see if there is a change to accession quality or quantity in Alaska and Hawaii. I rely on education level and previous service years within the federal government as an observable measure of quality.[19] I find in Figure 3g that the average education level of a hire did not change. However, I do find some evidence that workers being hired had lower experience, which is in Figure 3f. I further separate out hires by experience levels in Figure 4e and find a significant decrease of 31% in the 5-9 service years and 30% in the 10-14 service years. This is most likely due to better retention of workers, as shown in the previous section.

Last, I do not find any evidence that older or younger workers are more likely to be hired. In this case, there is no change in hires by age, as shown in Figure 4f. This finding is consistent with earlier evidence by Krueger (1988) which shows that changes in pension generosity do not lead to more applications for federal jobs. This may be due to several reasons. It may be a salience issue since job searchers may not have available information about pension plans. I include in Appendix A.3 a sample job listing. This job listing contains no information about benefits, suggesting that changes in pension generosity are not salient to job searchers. Alternatively, it could be due to workers' preferences for alternative forms of compensation. Future research should explore possible mechanisms. Overall, there is little evidence that increased pension generosity led to higher

[19] I utilize the education level provided by OPM to quantify this. For more information on education levels please see Appendix A.10.

observable quality workers or changes in the composition of workers. This suggests that policies aimed at recruiting workers through more generous pensions may have little impact.

1.6 Conclusion

In this paper, I study the impact of a 16-25% increase in pension generosity on labor. This policy represents an average estimated 5-10% increase in net wages while maintaining take home pay or a total wealth increase of approximately $96,000 to $126,000 for the average worker. I examine a range of outcomes on labor specifically related to retirements, retention and recruitment for the federal workforce.

The evidence presented suggests that the average worker, in the long run, does not change their labor supply significantly with respect to pension generosity. Previous literature has shown similar results with an elasticity close to 0. However, there is a large range of responses with older workers decreasing their labor supply and lower-wage workers increasing their labor supply. I find a larger range of elasticities than previously found. Given these findings, future policies will need to carefully consider the heterogeneous impacts of policy across workers.

Previous literature suggests that pensions have little effect on worker separations. I find a large significant negative effect on job quits for permanent workers while little effect on temporary workers. This distinction, not shown in previous literature, reaffirms early work from Lazear (1990). Further, this effect is increasing in service years which shows that pensions are effective tools in retaining workers with the highest levels of human capital. It is important for future policies to carefully consider the influence of pensions on the labor force given the substantial effects observed.

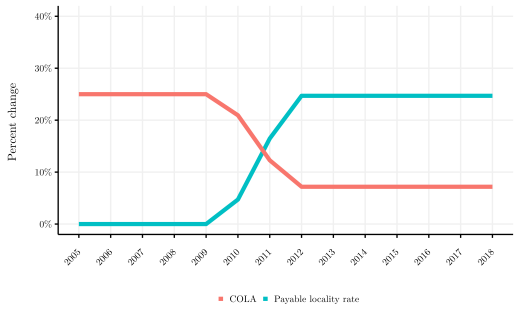
Last, I find no evidence that more generous pension benefits leads to better recruitment. This result is less clear since workers within the federal government respond to the policy by quitting less. Workers outside of the federal government may not be aware of the pension generosity. Krueger (1988) also suggests that fringe benefits may not be salient to workers when deciding where to apply for jobs. Future research should investigate this and explore possible mechanisms for how individuals search for jobs. If individuals are not aware of fringe benefits in their job search, this may mean policymakers will need to reconsider what forms of compensation are effective at attracting workers.

All together, I provide evidence of the effect of pension on several labor outcomes. The evidence shown suggests that pension benefits have large impacts on labor retention while smaller effects recruitment. Given the current state of state funding issues for pensions, I provide evidence that decreases in pension generosity may lead to higher levels of employee turnover. Additionally, there is evidence of large heterogeneity in retirement behavior with respect to pension policy. For effective workforce planning, policymakers will need to consider these factors when making budgetary decisions related to pensions.

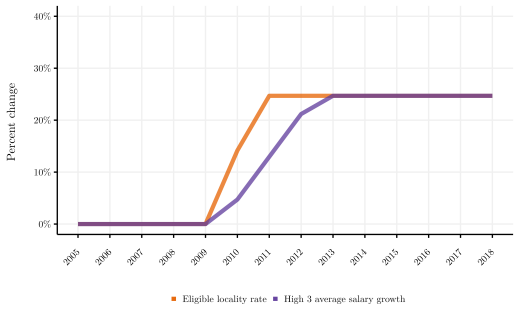
1.7 Figures

Figure 1. Theoretical change in compensation - Alaska

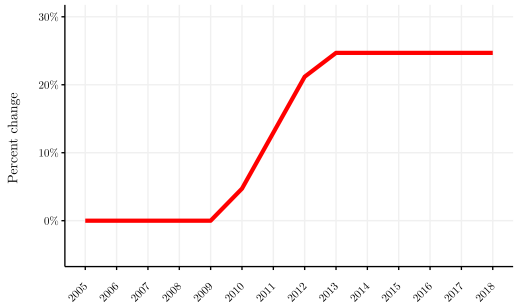
(a) Payable locality rate and COLA



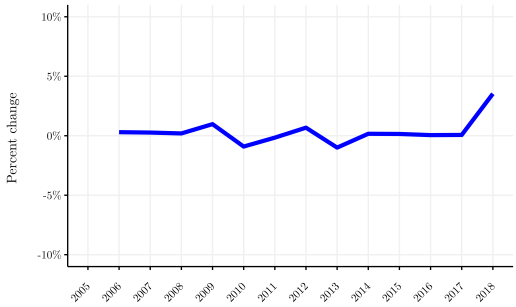
(b) Eligible locality rate



(c) Growth in pension benefits

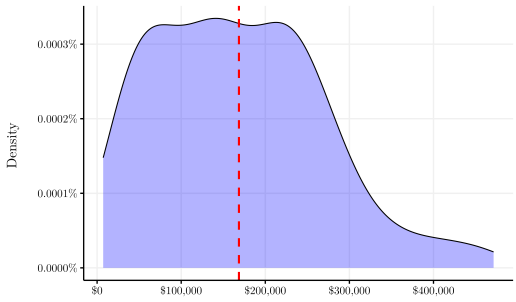


(d) Growth in wages



(e) Aggregate income

(f) Lower bound of pension growth

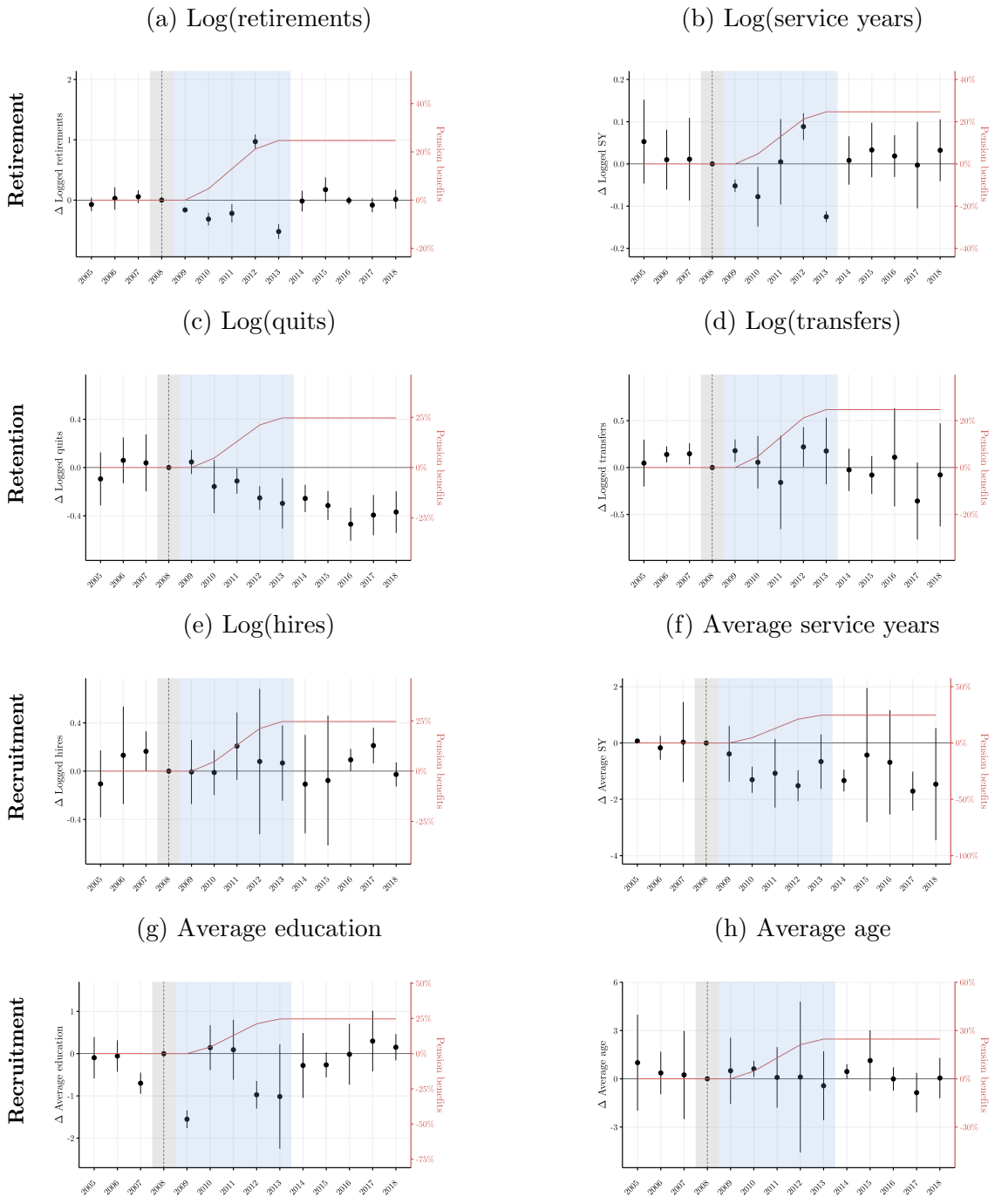


Notes: This figure highlights the effects of the policy for an example worker in Alaska. In Figure (a), there is an increase in locality pay and a decrease in COLAs. As a result, in Figure (b) the average high three salary increases. This increase translates to a higher pension benefit pay out shown in Figure (c). Figure (d) shows that the growth in wages during the policy were minimal. These estimates were imputed using TAXSIM 35 from the National Bureau of Economic Research. Due to data limitations, there is no information on marriage status. For this reason, I assume that individuals are single filers. Figure (e) shows the change in income for the median worker in Alaska. Figure (f) imputes the total pension growth for all 2007 Alaska retirees. This is the distribution of the lower bound estimate of the wealth shock because it does not factor in inflation and since it uses the upper bound within a given age brackets. For example: If someone is in the 60-64 bin, I impute their age to be 64. The red dotted line is the average increase in pension benefits.

Figure 2. Summary statistics

Notes: These are summary statistics for non-military, full time workers for the federal workforce from 2005 to 2020. Transfer out is when a worker transfers to another agency or another state. Other encompasses a variety of other separations and accessions. For separations these include: reduction in force, termination, death, early retirement, retirement with a disability. For accessions these include: mass transfers and senior executive appointments.

Figure 3. Effect of pension generosity on labor outcomes



Notes: All figures are an event study following the methodology in Clarke and Tapia-Schythe (2021). The gray shaded area represents the year the policy was passed in. The blue shaded area represents when the pension generosity increased. The red line represents the increase in pension benefit generosity due to the policy.

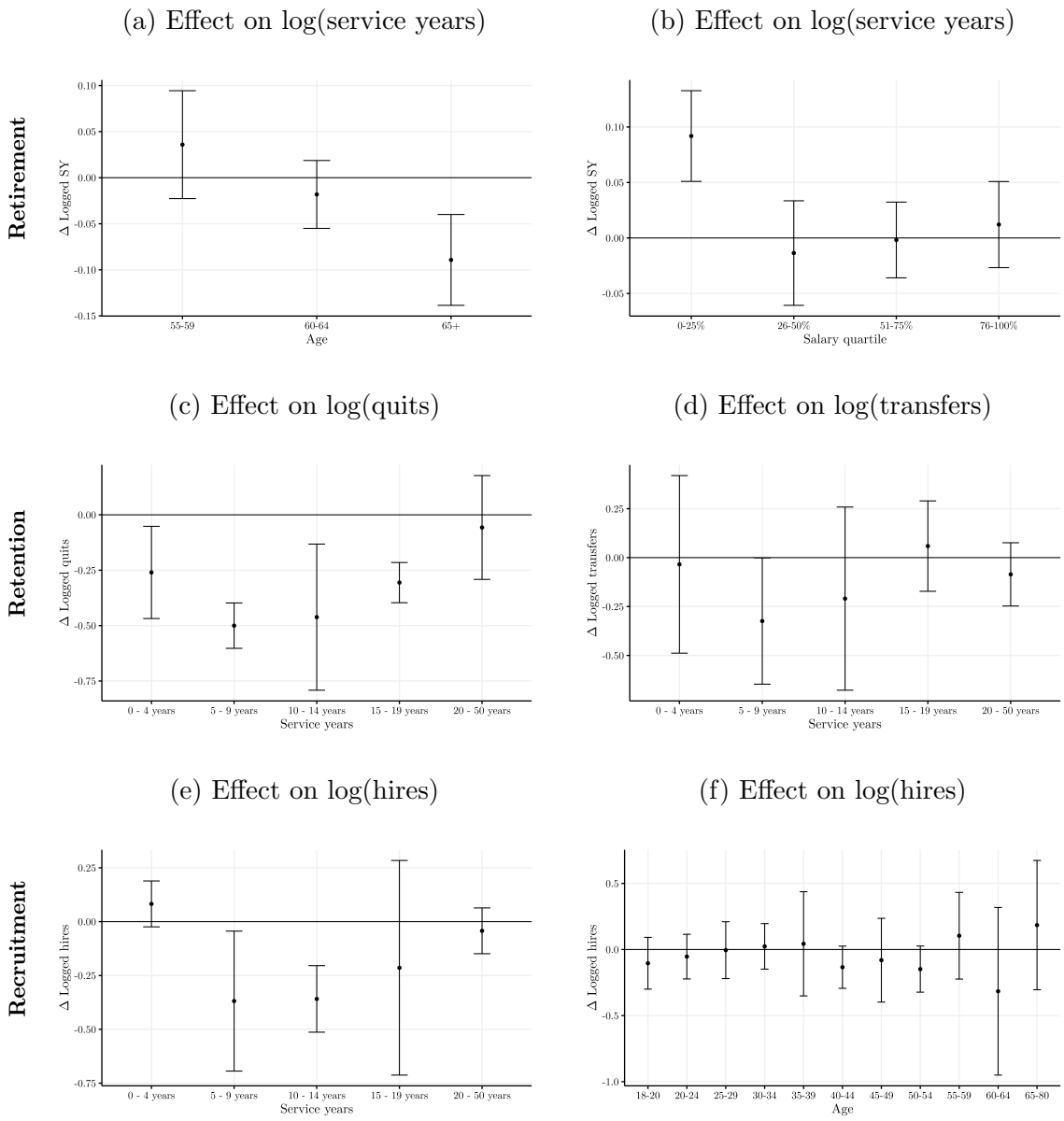
Table 1. Long run effect of pension generosity on labor outcomes

Outcome Group:	Retirement			Retention		Recruitment		Wages
Dependent Variables:	Pension ($)	log(Retirements)	log(SY)	log(Quits)	log(SHCL)	Mean Ed	Mean SY	Post tax income ($)
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × Time = 1	5,796.7***	0.01	-0.0006	-0.36***	-0.38***	0.19	-1.1***	-231.4
	(842.4)	(0.02)	(0.004)	(0.08)	(0.07)	(0.21)	(0.26)	(335.4)
Fixed-effects								
State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	459	459	459	459	459	459	459	459
R^2	0.83628	0.98493	0.63766	0.97493	0.96482	0.60751	0.65732	0.92766

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Notes: SHCL = Sum of human capital lossed. This represents the total years of experience that were lost due to quits. SY = Service years. This represents the years that a worker has spent working for the federal government. Ed = Education level. This represents the education level of a new hire.

Figure 4. Heterogeneity analysis



Notes: In this figure, I use a pre-post analysis to identify heterogenous effects by age, salary quartile, and service years. To compute salary quantiles, I standardize salaries within a given state in each year. I do this by aggregating each state by year and creating a distribution of wealth. I then compare a given quartile between treated and control.

CHAPTER II

PENSION REFORMS: THE EFFECT OF TRANSITION LENGTH ON FISCAL COSTS

2.1 Introduction

In October 2009, the "Non-Foreign Area Retirement Equity Assurance Act" (NFAREAA) gradually increased pension benefits by 16-25% for federal employees in Hawaii and Alaska. In the years preceding the full increase, there was a large decline in retirements. These individuals who delayed their retirement have additional costs to the system since they received higher pensions than they would have under the standard pension system. In this paper, I study the effect of varying transition lengths on retirement behavior and the additional fiscal costs incurred. I calibrate a structural model to this setting and test alternative policies. Depending on the time horizon, I find that cost estimates can be underestimated between 8% to 20% if retirement behavior is not accounted for.

Current pension and retirement systems are burdened due to aging populations. As of now, estimates suggest Social Security in the United States will be insolvent by 2035.[1] Further one third of state pensions will likely be insolvent if there are no changes (Aubry et al., 2018). This burden has not gone unnoticed as policymakers are weighing options on how to maintain these systems. Policy instruments include changing the generosity or increasing eligibility ages. For effective policy however, policymakers will need to correctly forecast short term and long term effects for fiscal stability. This suggests that the NFAREAA can provide insight on the short-term implications of pension policy.

[1] Recent estimates shown here.

There is a rich literature on the effect of pensions on retirement behavior. Early structural work such as Rust (1989), Stock and Wise (1990) and Gustman and Steinmeier (1986) has used general equilibrium models to estimate counterfactual retirement behavior.[2] Previous literature has focused on the effect of age restrictions and health insurance on retirement behavior for public pensions. This paper contributes by studying the transition length of pension generosity on retirement behavior.

This is the first paper to study transition length in the context of a change in pension generosity and its effect on retirement behavior. The closest paper that studies transition lengths for pension generosity is Martín (2010). Martín (2010) studies both i) changes to pension generosity by increasing the number of years eligible for the pension annuity calculation and ii) the effect to retirement age restrictions on the funding status of Spanish public pension. The current paper studies a similar aspect by estimating the effect of pension generosity on the cost impacts of pension funding status. However, it differs in several key ways. This paper studies the effect of a generosity change, rather than a change in the calculation of the pension annuity. Additionally, this paper studies transition lengths, estimating the effect of a longer versus shorter transition length on worker retirement behavior. These differences have previously not been studied, however they have implications for pension policy.

[2]More recently, French (2005) and French and Jones (2011) incorporate health into these models.

2.2 Background information

The previous chapter in this dissertation provides more in-depth explanation of the federal policy. I briefly provide the key details of the policy. Previous to NFAREAA, pension benefits for federal workers in non-foreign areas (NFA) such as Alaska, Hawaii, or Guam were significantly lower than for workers in the contiguous United States. This is because workers in NFAs received a COLA to compensate for higher prices. However COLAs are non-taxable income and are not considered when calculating pension benefits. This meant, previous to the policy, workers in NFAs received similar wages to workers in the contiguous United States, but received disproportionately lower pension benefits. NFAREAA transitioned COLAs to locality pay for each non-foreign area over a three year period. Locality pay is taxable income and is considered when calculating pension benefits. As a result, pension benefits significantly increased. However for workers to receive these benefits, they had to continue to work through the transition period.

The formula used by the Office of Personnel Management (OPM) to calculate pensions is in general:

$$\text{Pension} = 1.1\% \times \text{High-3 Average Salary} \times \text{SY} \tag{2.1}$$

where

$$\text{High-3 Average Salary} = \max_{j} \frac{\sum_{t=j-2}^{j} \text{Salary}_t}{3} \tag{2.2}$$

and

$$\text{Salary} = \text{Base Pay} \times \text{Locality Pay Multiplier} \tag{2.3}$$

SY is service years which is the time spent working for the federal government. High-three average salary is the average of the highest three continuous years of taxable salary while working for the federal government. Since cost of living adjustments (COLAs) are non-taxable, they do not affect a worker's high-three average salary. This implies switching COLAs to locality pay directly increased pension benefits by increasing a worker's taxable salary. However, it is important to note that workers received a reduced COLA which offset the increase in locality pay, resulting in workers having the same after-tax take-home pay.[3]

For workers in Alaska and Hawaii, this increased pension annuities for the average worker by $6,000 or an average of 21%. All together, this demonstrates the quasi-experimental variation induced by the pension policy. The policy induced higher pension benefits for all workers residing in NFAs while all other states had no change in pension benefits.

2.3 Data

The data used in this analysis comes from the Office of Personnel Management (OPM) which collects data on federal workers for administration purposes OPM (2005). The data contains information on the federal workforce. The data are at the worker-year level from 2005 to 2018 and provides detailed information on salary, education level, occupation, agency, age level, years of service and other variables. The data is repeated cross-sections for each year with no worker identifiers. Altogether, there are three datasets: the first provides a cross-section of all workers employed by the federal government; the second provides a cross-section of accessions into the federal government; and the last one provides a cross-section of separations out of the federal government.

[3]Workers feared losing wages due to the policy so the adjustments to COLA offset increases in locality pay to avoid this situation. Please see the following: link.

2.4 Model

Let there exist a set of workers who maximize the following value function:

$$\max_{r} V(r,\alpha) = \sum_{0}^{r}[u(w)-\delta] + \sum_{r+1}^{T}[u(B(r,\alpha))] \tag{2.4}$$

$$= r \times [u(w)-\delta] + (T-r-1) \times u(B(r,\alpha)) \tag{2.5}$$

where r is retirement period, α is pension generosity, and $B(r,\alpha)$ is the benefit formula for a worker's pension.[4] Let $B(r,\alpha) = w \times \alpha \times r$.[5] The first order condition of the worker's maximization problem is:

$$FOC : \frac{dV}{dr} = 0 \tag{2.6}$$

$$= u(w) - \delta + (T-r-1) \times u'(B(r,\alpha)) \times B'(r,\alpha) - \times u(B(r,\alpha)) \tag{2.7}$$

This can be rewritten as follows:

$$FOC : \delta + u(B(r,\alpha)) = u(w) + (T-r-1) \times u'(B(r,\alpha)) \times B'(r,\alpha) \tag{2.8}$$

where leisure and the current pension are given up for one additional year of wages and the increased lifetime return to their pension. Each period an agent makes a decision if they should delay retirement or retire today where the LHS represents the benefit of retiring today and the RHS represents delaying retirement.

Consider the case where the firm transitions to a more generous pension package or $\alpha \to \alpha'$ where $\alpha' > \alpha$ between time periods t and t'. Let this transition be smooth or that the increase be $\frac{\alpha'-\alpha}{t'-t}$ for each time period t. In this case, for agents in the first period of the announced pension policy, their FOC will now be:

[4] Assuming no discounting behavior. This can be relaxed.

[5] This follows the form of the federal government.

$$\delta + u(B(r, \alpha_t)) = u(w) + (T - r - 1) \times u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1}) \tag{2.9}$$

For workers, there are two separate effects as pension generosity increases.

1.) As pension generosity increases, the current pension annuity, $u(B(r, \alpha_t))$, increases. This incentives workers to retire earlier.

2.) As pension generosity increases, there is now higher returns to working an additional year, $u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1})$. This will incentive workers to retire later.

To consider these effects, I calibrate the model using OPM data and simulate the behavior using a representative agent.

2.5 Calibration

To calibrate the model, I consider the following. Let there exist a distribution of workers, heterogenous in preferences over leisure, retiring each period t. From the previous chapter, I observe there exists a set of workers who do not retire after the onset of the policy. This "missing mass" is evident in Figure 5. I make the assumption that those individuals who are in the "missing mass" choose to retire in 2013 instead.[6] For individuals that retire in the current period, it must be that the value of retiring today is greater than the financial returns to working:

$$\delta + u(B(r, \alpha_t)) > u(w) + (T - r - 1) \times u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1}) \tag{2.10}$$

while for workers that choose not to retire, it must be that the value of retiring today is less than the financial returns to working:

[6]This is plausible given the large mass of individuals retiring in 2013.

$$\delta + u(B(r, \alpha_t)) < u(w) + (T - r - 1) \times u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1}) \tag{2.11}$$

Assuming that the distribution of workers is smooth and continuous and that a set of workers delayed their retirement, then there must exist a worker such that:

$$\delta + u(B(r, \alpha_t)) = u(w) + (T - r - 1) \times u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1}) \tag{2.12}$$

This equality condition implies that there exists a worker who is indifferent between retiring today and delaying their retirement by one year. Assume that there exists a underlying distribution of δ with some average, μ, and standard deviation, σ. Workers who choose to delay their retirement will have a lower δ. Since we observe the proportion of workers that choose to not delay, then we observe what percentile the individual comes from within the distribution. This is shown in Figure 5. With two conditions, then it is possible to estimate two parameters, μ and σ. In this model, I use three conditions to estimate μ, σ and γ where γ is the curvature of the CRRA utility function.

$$\text{Moment 1: } V(r, \alpha_t) = V(r + 1, \alpha_{t+1}) \tag{2.13}$$

$$\text{Moment 2: } V(r, \alpha_t) = V(r + 2, \alpha_{t+2}) \tag{2.14}$$

$$\text{Moment 3: } V(r, \alpha_t) = V(r + 3, \alpha_{t+3}) \tag{2.15}$$

To control for observables, I restrict the sample to 55-59 year olds with below average experience and below average salary. This better controls for T, r,

and w.[7] Using these presets, I find the following parameter estimates: $\gamma \approx 1.03$, $\mu \approx 2.29$ and $\sigma \approx 0.12$. As in Chetty, Guren, Manoli, and Weber (2011), the estimated curvature of utility is close to 1. Additionally, the average wage in the sample used is \$63,620 so this means that leisure represents 19% the value of work. The standard deviation is 0.12 so the range of disutility of labor is from 15% to 23% at the 2nd deviation. For robustness, I include the cases where δ represents 50% of wages and where δ represents 10% of wages.

2.6 Results

To compare the unanticipated and anticipated costs of a given policy transition length, I provide results for three time horizons in this paper: 5 year, 10 year and 20 year. Given there is no preset time horizon, I include a shorter time horizon (5 year) and a longer time horizon (20 year). For a given time horizon, I calculate the total cost of pensions in the total time horizon under the naive model. The naive model in this situation is where agents are not allowed to dynamically optimize in response to the policy. This means that their retirement date will be the same as in the pre-period. Separately, I calculate the model where I allow agents to dynamically reoptimize in response to the policy. This provides the opportunity to calculate a ratio in costs between the two estimates.

In Figure 6, I provide two different transition lengths as examples to show the dynamics of workers. In the left panel, I provide an example of where agents cannot anticipate the policy (the transition length is one year so agents are not able to delay their retirement). In this figure, agents decrease their labor supply and retire earlier in the post transition, but there is no anticipatory effect on workers.

[7]This does not perfectly control for these variables. To do so, we would need to restrict the sample down further (such as to only 55 year olds with 20 years of experience) however this comes at the cost of a smaller sample and noisier estimates.

On the right side of the panel, I provide an example where agents can anticipate the policy (the transition length is five years). In this case, there is a large amount of agents that delay their retirement in response to the policy. This leads to higher costs since workers are now retiring with more generous pensions than otherwise anticipated.

In Figure 7, I show the effect of various transition speeds on retirement behavior. As transition lengths are increased, then the marginal increase in pension generosity is smaller. This means that there is decreasing incentive for workers to delay with longer transition periods which is shown in the following FOC.

$$\delta + u(B(r, \alpha_t)) = u(w) + (T - r - 1) \times u'(B(r, \alpha_{t+1})) \times B'(r, \alpha_{t+1}) \tag{2.16}$$

However simultaneously, there are more workers able to update their labor response as transition lengths increase. These have a multiplicative effect. This is why transition lengths that are between five and seven years have the largest peak in retirements. Transition lengths less than five years have large pension gains, but there are less workers that can anticipate the policy. Transition lengths greater than seven years have large amounts of workers who can anticipate the policy, but the marginal returns to working are smaller so workers are less likely to delay their retirement.

Last in Figure 8, I vary the transition length and estimate the unanticipated costs due to changes in retirement behavior. As mentioned previously, different time horizons change the calculation of the total cost of pensions.[8] I include three scenarios: a short term, medium term and long term scenario. In the short term

[8]I assume that pensions are paid out at time of retirement in lump sum rather than in annuities.

scenario of five years, a transition length of five years can mean that pensions paid out are underestimated by 20%. When looking at the ten year horizon and twenty year horizon, this decreases to 11% and 8%. For robustness, I consider the case where the value of leisure is between 10% and 50% of wages. These estimates can be seen in Figure 9. I find that at the highest, costs could be underestimated by 26% and at the lowest, costs could be underestimated by 0%.

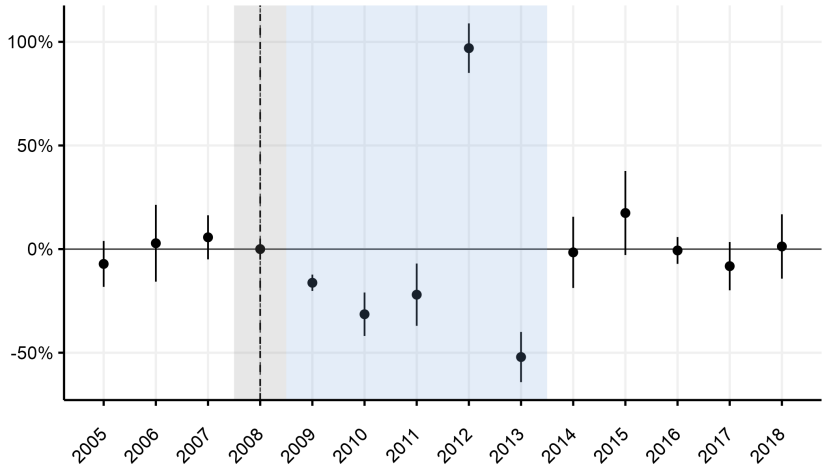
2.7 Discussion

As policymakers weigh policy options to keep pensions solvent, they will also need to have full information on the costs of potential options. In this paper, I evaluate a particular policy setting where pension generosity is increased. Here I estimate two models: a static model where workers do not change their labor supply in response to the policy and a dynamic model where workers do change their labor supply. I look at various time horizons to see the impact on cost estimates. I find that at the largest, these effects can underestimate the true cost of the policy by 20%. I find at the smallest, these effects may underestimate the cost by only 8%. Policymakers will need to account for these costs when weighing options.

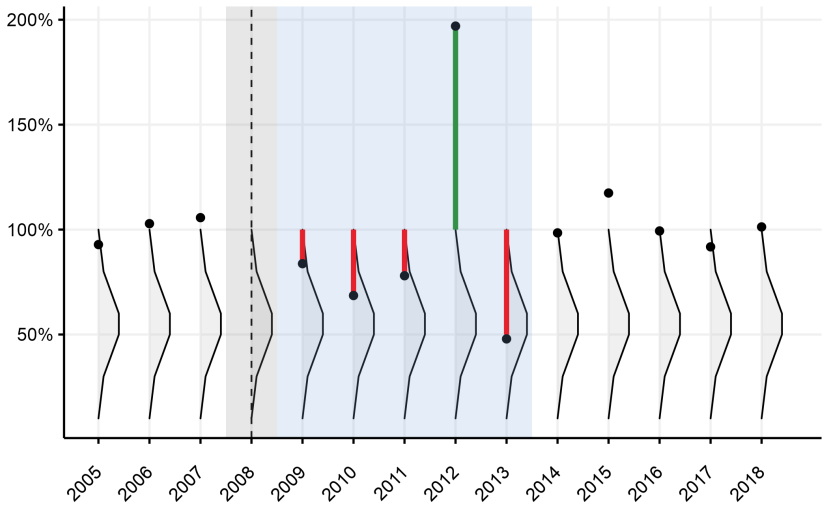
2.8 Figures

Figure 5. Event study and distribution of workers retiring

(a) Effect of pension generosity on total retirements

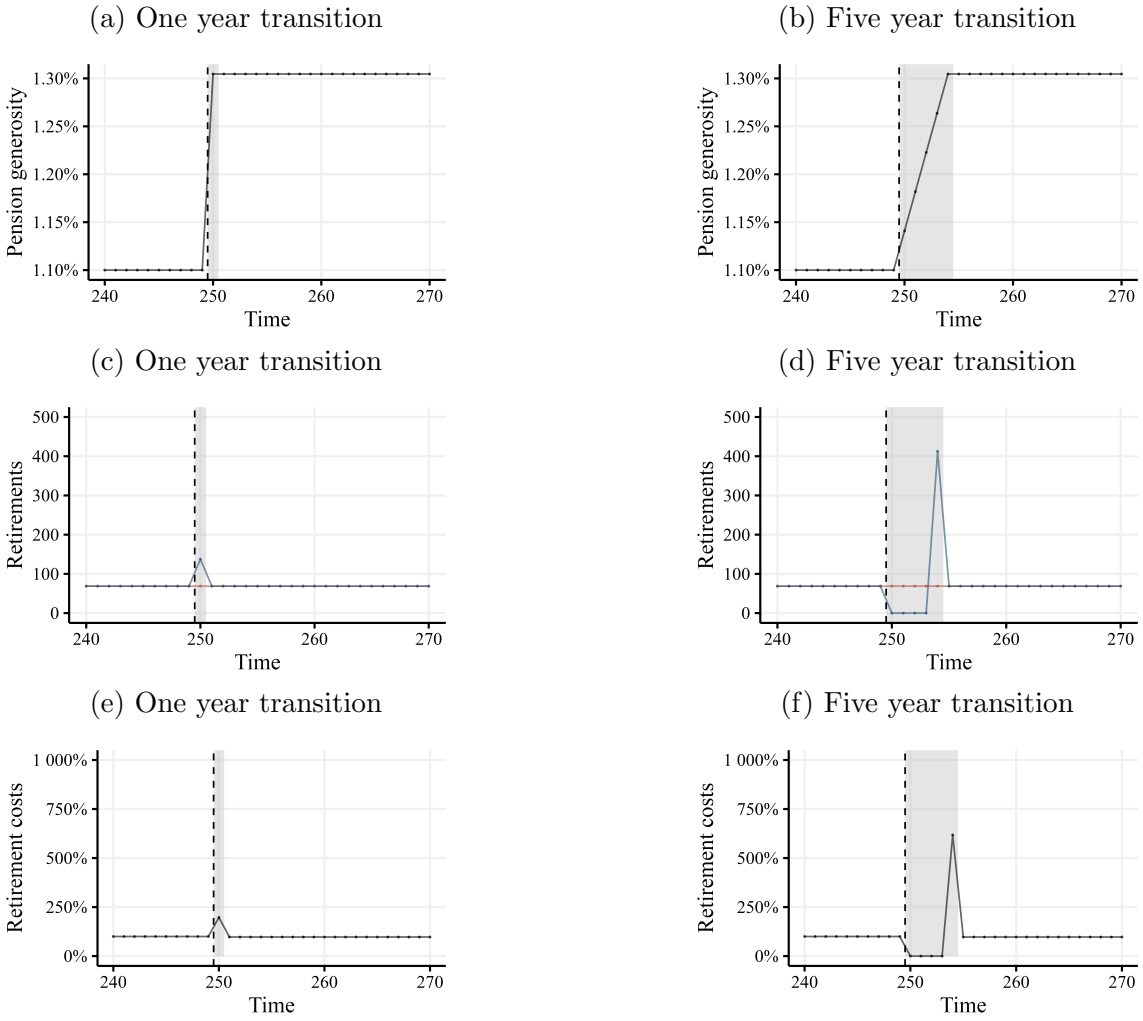


(b) Event study versus distribution of workers retiring



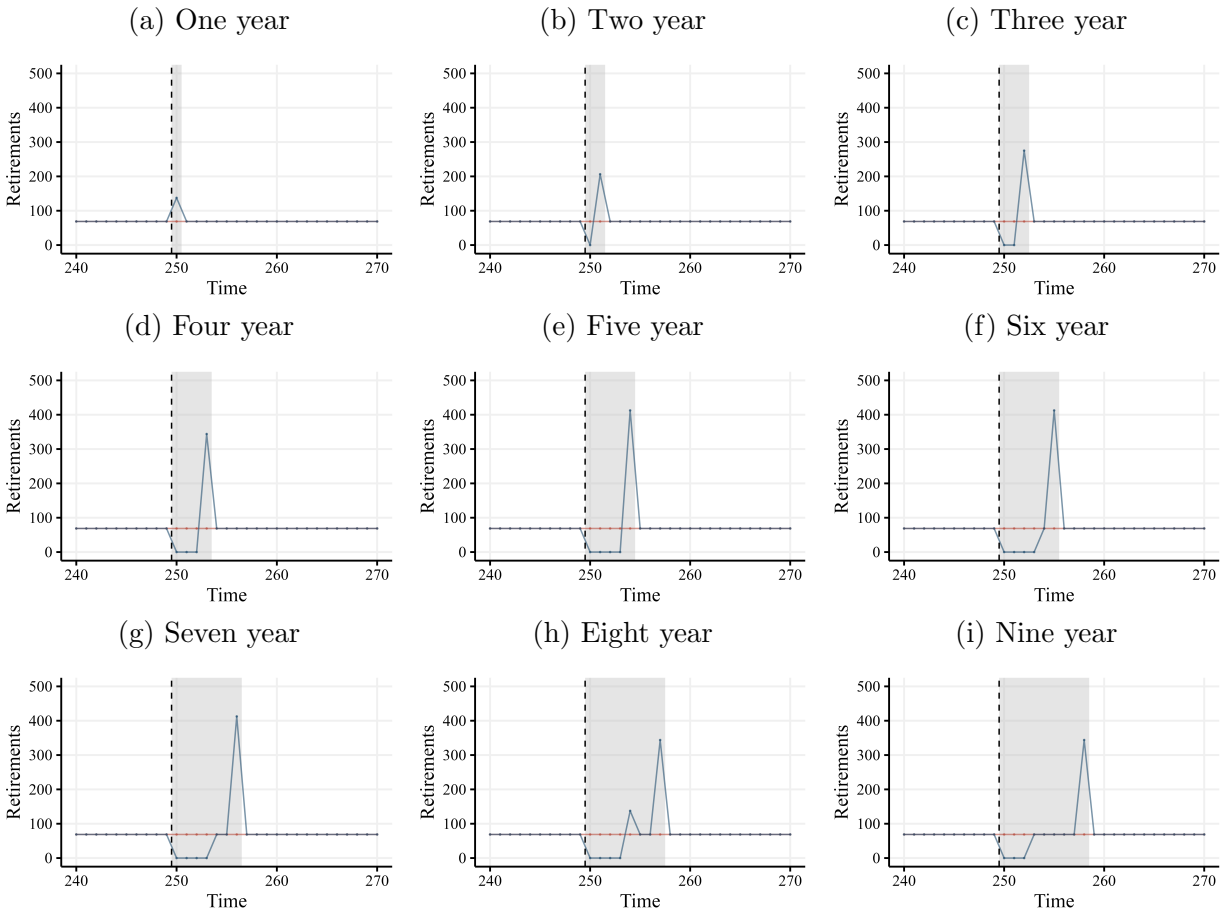
Notes: The first figure is from the previous chapter, documenting the effect of pension generosity on retirement behavior. The second figure highlights the "missing mass". In 2009, 2010, 2011, and 2013, there is a set of workers not retiring. This is highlighted in red. Additionally, there is an excess of retirements in 2012. This is highlighted in green. The identification assumption used for the calibration of the model is that workers that did not retire in 2009, 2010, 2011 and 2013, instead retired in 2012. This can be used to create inequalities for workers that did retire compared to those who did. Given there exists a distribution of δ, then workers with higher δ will retire. Workers with lower δ will delay retirement. By monotonicity, there exists a worker who is perfectly indifferent from retiring today and delaying retirement. This provides an equality that can be used to solve for the underlying distribution of δ.

Figure 6. Pension generosity - transition speed



Notes: This figure provides examples of two different transition paths. The first transition path is a one year transition which is shown in the left panels. The upper panels shows the transition path of pension generosity over a particular transition length. The middle panels show the number of retirements over time. The lower panels show the total cost of retirements across time. The left panels represent the one year transition. The one year transition doesn't allow agents to anticipate the increase and so there is an increase in retirements due to agents retiring earlier. The five year transition has larger levels of anticipation. In this case, agents delay their retirement due to the increased financial returns of work.

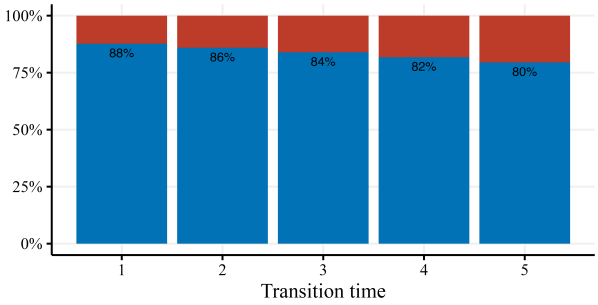
Figure 7. Retirements across different transition lengths



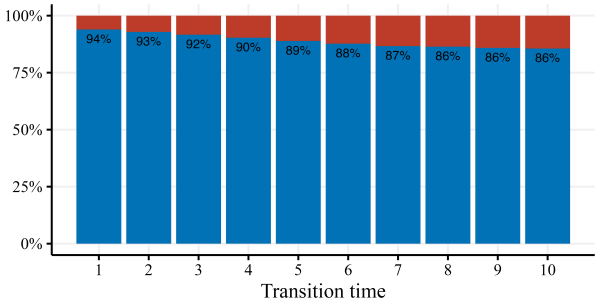
Notes: This figure shows the various retirement responses by transition speeds. The black dotted line represents when the policy is announced. The gray shaded region represents the period in which pension generosity is increasing. The red line represents the naive model where agents do not dynamically change their retirement date. The blue line represents the model where agents respond to the policy and update their retirement.

Figure 8. Unanticipated costs across time horizons

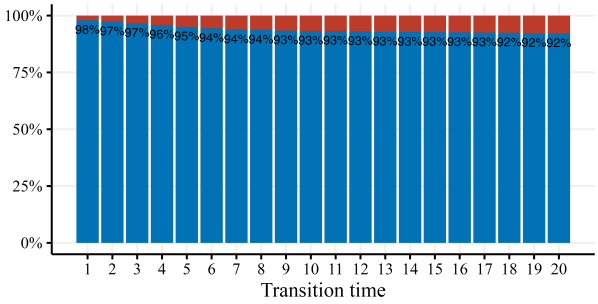
(a) Five year time horizon



(b) Ten year time horizon



(c) Twenty year time horizon

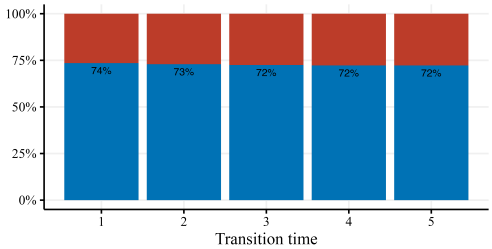


Notes: This figure shows the various time horizons and the relative costs due to delaying retirement. Each column divides the total costs into the naive cost estimate and the unanticipated additional costs. For example in the five year time horizon (panel A), unanticipated costs approximately 20% of total costs with a five year transition length. Since the total costs are dependent on the time horizon, I use three scenarios to represent the relative cost of unanticipated costs: five year, ten year and twenty year time horizons.

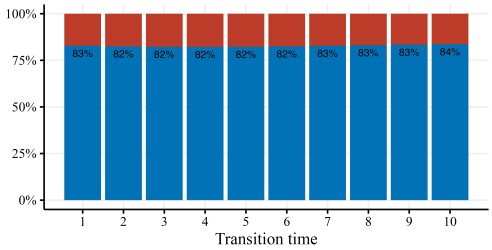
Figure 9. Unanticipated costs across time horizons - low and high δ

Low δ

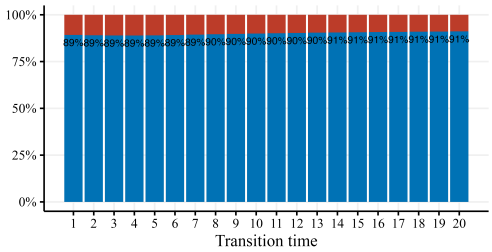
(a) Five year time horizon



(c) Ten year time horizon

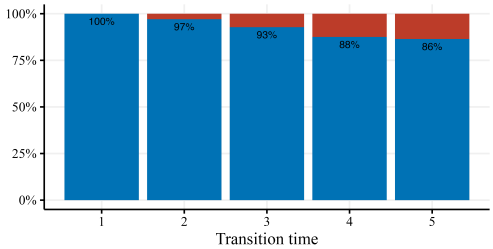


(e) Twenty year time horizon

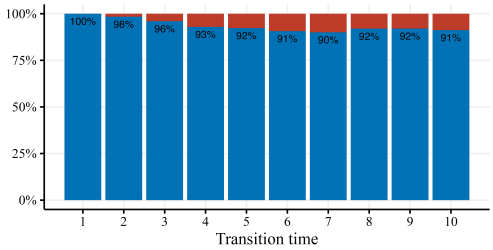


High δ

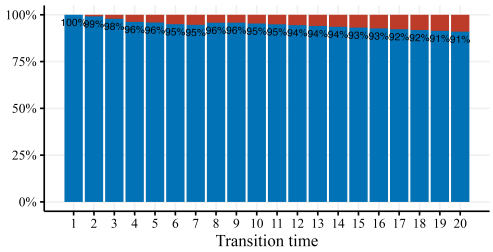
(b) Five year time horizon



(d) Ten year time horizon



(f) Twenty year time horizon



Notes: This figure shows the various time horizons and the relative costs due to delaying retirement. Each column divides the total costs into the naive cost estimate and the unanticipated additional costs. This figure includes estimates for unanticipated costs for when δ (or the value of leisure) is 50% the value of wages and for when δ is 10% the value of wages. These provide alternative estimates compared to the case above where δ is approximately 20% the value of wages.

CHAPTER III

HOW DID FEDERAL AGENCIES RESPOND TO THE MANDATED REPRESENTATION OF DISABLED WORKERS?

This chapter is co-authored with Glen Waddell: we both contributed to the writing and statistical analysis of the manuscript.

3.1 Introduction

On January 3rd, 2017, the Equal Employment Opportunity Commission (EEOC) issued its final rule that requires federal agencies to engage in affirmative action for individuals with a disability.[1] *Affirmative Action for Individuals with Disabilities in Federal Employment*, effective March 2017, mandates that each federal agency must maintain a minimum of 12 percent disability representation among permanent employees, and a minimum of 2 percent representation in a smaller category of "targeted" disabilities.[2] This rule change is binding separately on lower and upper pay grades—General Schedule (GS) grades 1 through 10, and GS grades 11 through Senior Executive Service, respectively.[3] Within the lower and upper pay grades, however, permanent employees with a targeted disability contribute to both the 2 percent and 12 percent quotas. While there is previous literature on the implications of race-based affirmative action, less is known empirically about disability-based affirmative action. This setting provides an

[1] The final ruling is available from the Federal Register here.

[2] Targeted disabilities are defined to be: hearing loss, vision loss, missing extremities, paralysis, epilepsy, intellectual disabilities, psychiatric disabilities, and dwarfism. In 2017, four additional categories were added to the set of targeted disabilities—developmental disabilities, significant mobility impairment, significant disfigurement, and traumatic brain injuries.

[3] For example, an agency with 5000 workers where 3000 are GS 1-10 and 2000 are GS 11–SES is required to have $3000 \times .12 = 360$ workers with a disability among those with GS 1-10 classifications, 60 of whom must have targeted disabilities, and $2000 \times .12 = 240$ workers with a disability among those with GS 11–SES classifications, 40 of whom must have targeted disabilities.

opportunity to understand the effect of disability-based affirmative action on the public workforce.

In this paper, we use detailed employment data from federal agencies to understand the effects of disability-based affirmative action on the federal workforce. We find that, for the agencies which the mandate is binding, disability-based affirmative action leads to an increase in disability representation. We document that this increase is due to hiring of workers with a disability, particularly less severe or non-targeted disabilities. For agencies that satisfied the quota as of 2016, we find they experience a decrease in disability representation. This suggests that quotas are effective at increasing disability representation, particularly less severe disabilities, but may lead to decreased representation in agencies that satisfy the quota.

This paper contributes to several literatures. It studies the impact of disability-based affirmative action on the labor market within the public workforce. Previous literature has documented the effects of affirmative action on the labor market (de Araújo et al., 2022; de Souza, 2020; Miller, 2017; Mori & Sakamoto, 2018; Szerman, 2022; Welch, 1976). This paper brings descriptive evidence that affirmative action changes the hiring behavior of agencies. In particular, there is evidence that this increase in hiring is relatively larger for less severe disabilities compared to more severe disabilities.

Further, this paper contributes to literature on policy targeted for people with a disability. Previous literature has documented the unintended consequences of policy intended to help workers with a disability (Acemoglu & Angrist, 2001; Aizawa, Kim, & Rhee, 2024; Autor, Kostøl, Mogstad, & Setzler, 2019; DeLeire, 2000; Kostøl & Mogstad, 2014; Lalive, Wuellrich, & Zweimüller, 2013; Palmer

& Williams, 2020). This paper suggests that disability-based affirmative action may have unintended consequences. While we find evidence that agencies increase representation of workers with a disability, we also find evidence that agencies which do satisfy the quota decrease disability representation. This decrease in disability representation may be an unintended consequence of setting a quota.

In the following section, we provide descriptive statistics on the federal workforce. We, then, offer concluding thoughts in the last section.

3.2 Empirics

In considering the change in representation associated with the 2017 quotas, we use data provided by the Office of Personnel Management (OPM), the agency responsible for the collection and maintenance of information on the federal workers for administration purposes. In all analysis, we consider the largest 13 federal agencies—these represent approximately 90.6 percent of the total permanent federal workforce over the 2010 to 2022 period. For the remaining agencies, we do not include them in the analysis. This is because these agencies are censored by OPM due to small counts.[4]

3.2.1 Trends in representation. In Figure 10, we plot disability representation in the federal workforce over time. In Panel A, we plot all disabilities—targeted and non-targeted disabilities together. This is the measure of representation that was newly subject to the 12-percent quota in 2017. We distinguish agencies for which the 12-percent quota was binding at the time of implementation by solid lines, while agencies that already met the quotas when announced, we represent with dashed lines. Of the largest 13 federal agencies in 2016, 7 had more than the required 12 percent of their workforce with a disability

[4]Counts less than four are not provided by OPM.

in grade 1–10, so would find the mandate binding. Only 2 agencies of the largest 13 had more than the required 12 percent of their workforce with a disability in grade 11–SES. For those agencies that do not satisfy representation requirements–in either the grades 1–10 or grades 11–SES categories–they are required to develop and implement a plan that "provides sufficient assurances, procedures, and commitments to provide adequate recruitment, hiring, and advancement opportunities for individuals with a disability at all levels of federal employment."

In the seven years leading into the mandate, the rate of disability representation among permanent workers at federal agencies is increasing. On average, the annual rates of increase are 0.68 percentage points in grades 1–10, and 0.50 percentage points in grades 11–SES. (See Table 2, columns 1 and 4.) With the mandate, the trend in grades 1–10 decreases by 0.52 percentage points ($p = 0.01$). However, stratifying agencies by whether the mandate is binding in 2016 reveals that this is being driven by a decrease of 0.83 percentage points among those agencies on which the mandate did not bind ($p = 0.02$). There is no discernible change in the trend in grades 11-SES, although point estimates suggest a small level decrease in representation with the mandate.

In Panels B and C of Figure 10, we separate disabilities into targeted disabilities, which were subject to a two-percent quota, and non-targeted disabilities. However, here we run into a data limitation—we are unable to untangle the change in representation of targeted disabilities from the coincident move of categories from non-targeted to targeted. In 2017, the EEOC redefined targeted disabilities to include significant disfigurement, mobility impairment, developmental disability, traumatic brain injury and subcategories of hearing loss, vision loss, paralysis and missing extremities. Given the new definition and potential for

workers to be revealing their disability simultaneously, we cannot verify if the increase in targeted disabilities solely comes from the decrease in non-targeted disabilities.

In 2017, we find that there is an increase in the representation of targeted disability of 1.7 percentage points for grades 1–10 and 1.5 percentage points for grades 11–SES. In the same year, there is a decrease in representation of non-targeted disabilities of 1.2 percentage points for grades 1–10 and 1.1 percentage points for grades 11–SES. Under the assumption that all of the decrease in non-targeted disabilities is fully absorbed by the increase in targeted disabilities, then approximately 70 percent–70.9 percent of the increase in targeted disabilities can be accounted for by the decrease in non-targeted disabilities. Of the largest 13 agencies, 10 agencies were now able to meet the quota due to this one time jump for grades 11–SES and 8 agencies for grades 1–10. This is suggestive that the redefinition may have contributed to the success of agencies achieving targeted disability representation.

3.2.2 Hiring and separations. Agencies have several potential actions available to increase representation. In Figure 11 Panel A, we consider the trends in hiring. Prior to the mandate, disability representation in hiring is increasing in grades 1–10 (0.85pp; $p = 0.01$) and grades 11–SES (0.23pp; $p = 0.19$). With the quotas, there is a decrease in the trend of hiring in grades 1–10 (-0.64pp; $p = 0.11$) and an increase in grades 11–SES (0.82pp; $p = 0.0008$) for total disability. We further explore these trends by targeted and non-targeted disability. For grades 1–10, when stratified, we find that agencies that satisfied the mandate experienced a decrease in hiring of both nontargeted (-0.51pp; $p = 0.19$) and targeted disability (-0.22pp; $p = 0.47$) while agencies that did not satisfy

the mandate experienced an increase in hiring of both nontargeted (0.21pp; $p = 0.31$) and targeted disability (0.09pp; $p = 0.001$). For grades 11–SES, We find that there is a significant increase in targeted disability hiring for all agencies in Table 5. However there is a larger effect for non-targeted disability hiring for grades 11–SES that is approximately five times as large compared to the increase in targeted disability hiring (0.16pp; $p = 0.002$ vs 0.73pp; $p = 0.0004$). This suggests that the mandate led to increased hiring of workers with a disability, particularly non-targeted, or less severe, disabilities.[5]

Last, we test if there are changes to separations which can be seen in Figure 12. For grades 1–10, the change in trend for total disability is non-significant and small (0.38pp; $p = 0.22$). However, there is a level decrease in separations when the policy is enacted (-2.37pp; $p = 0.01$). This can be seen in Figure 12 Panel A. Similarly, for grades 11–SES, there is little effect on the trend (0.14pp; $p = 0.41$). These are shown in Table 7.

3.3 Conclusion

In conclusion, we preliminarily consider the implementation of disability-based affirmative action within the federal workforce. Agencies that satisfied the grades 1–10 total disability 12 percent quota experienced a significant decrease in their trend post mandate (0.83pp; $p = 0.02$). Agencies that did not satisfy the grades 1–10 and grades 11–SES total disability quota, maintained a positive trend in representation growth. Additionally, for agencies that did not satisfy the grades 11–SES total disability quota, we find there is a large increase in hiring (0.75pp; $p = 0.01$) post mandate. We find this increase in hiring is largely due to more

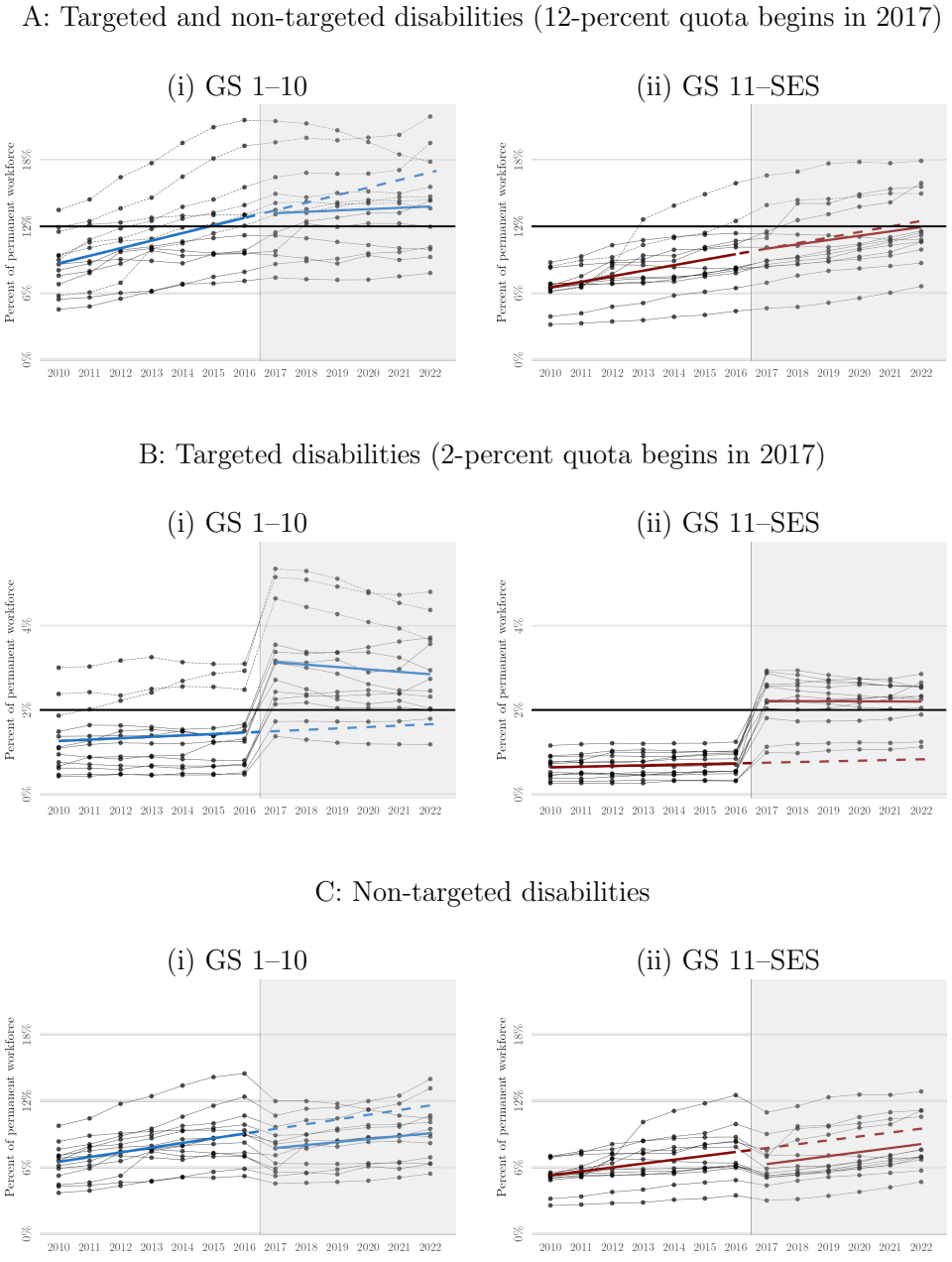
[5]A caveat to this is that by broadening the definition of targeted disabilities, there could have been more hiring in the targeted disability category simply do to the fact there are more eligible disabilities in this category.

hiring of workers with non-targeted, or less severe, disabilities. This suggests that there are distributional impacts of the mandate across disability type; less severe disabilities have larger increases in hiring relative to more severe disabilities.

Our findings highlight that disability-based affirmative action may have plausible increases on hiring of workers with a disability. This policy platform has been implemented across several countries with the intention of decreasing the employment gap between workers with a disability and workers without disabilities. However we further consider this mandate's distributional effects across disability type and suggest there may be asymmetries in the types of disabilities that benefit. Future policy that intends to mandate disability-based affirmative action may need to consider representation goals for various disability types to achieve equitable outcomes.

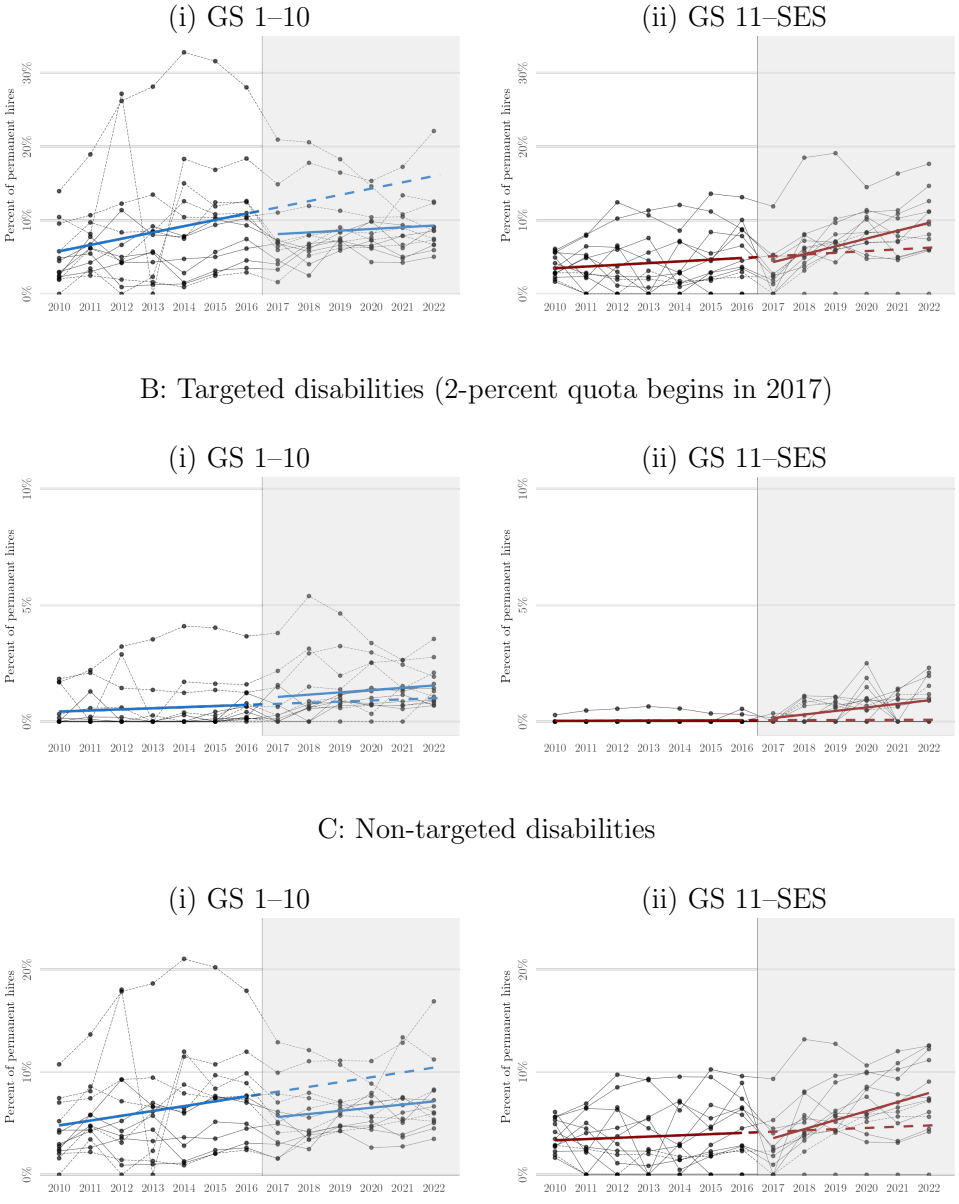
3.4 Figures

Figure 10. Representation in the permanent federal workforce, by agency



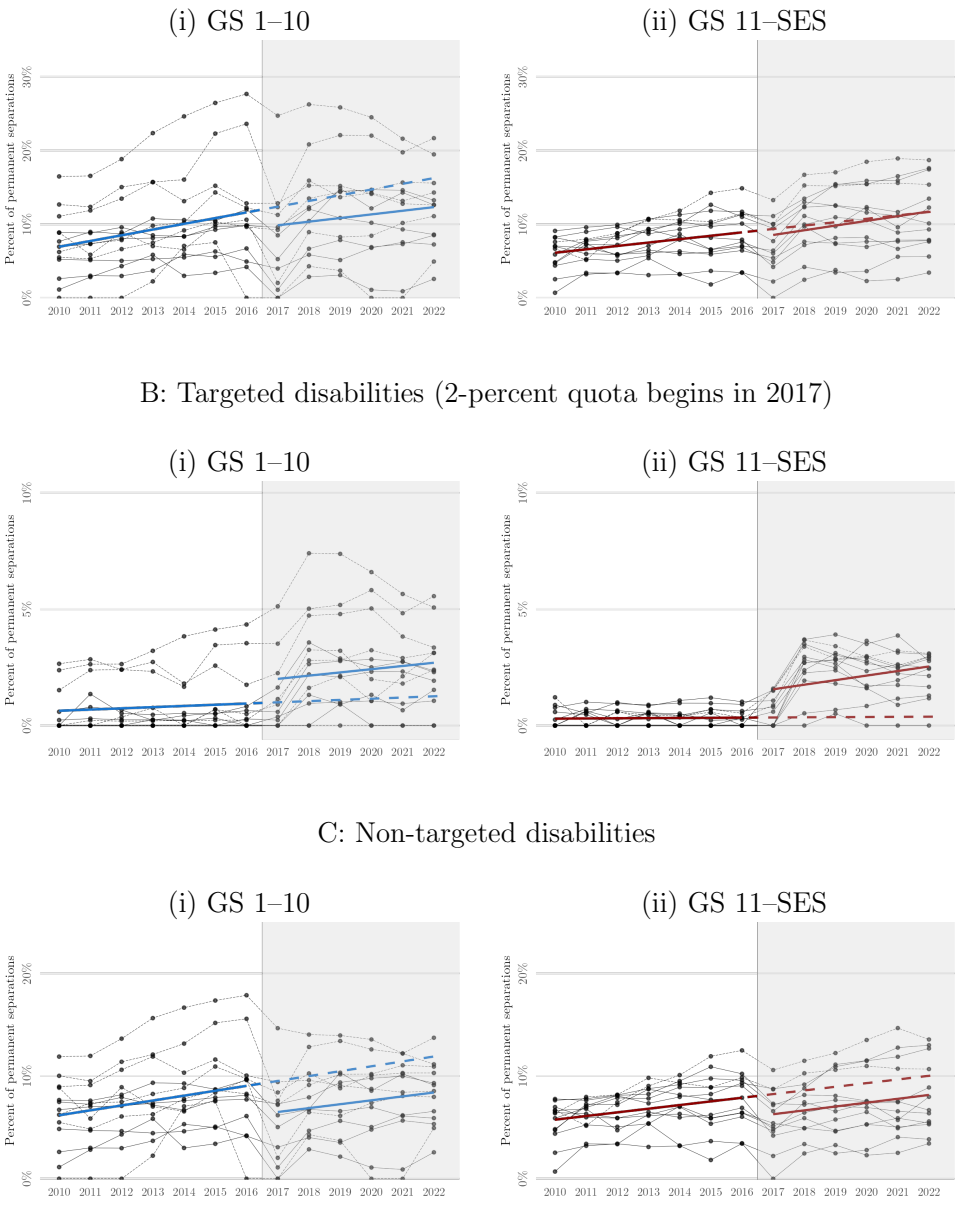
Notes: Beginning in 2017, all federal agencies are to assure that permanent employees with a disability account for a minimum of 12 percent of their permanent workforce—12 percent within grades 1–10 and 12 percent within grades 11–SES. Further, a minimum of two percent in each grade category are to be from a list of targeted disabilities. On either side of the introduction of quotas we also show the predicted values of a (linear in time) model of representation.

Figure 11. Percent of permanent hires with a disability, by agency



Notes: This figure shows the proportion of workers with a disability hired relative to all workers hired in a given year for each agency. On either side of the introduction of quotas, we also show the predicted values of a (linear in time) model of representation. For non-targeted and targeted disabilities, there is a change in definition in 2017 which increased the number of disabilities categorized as targeted and decreased the number categorized as non-targeted.

Figure 12. Percent of federal workforce with a disability separating, by agency



Notes: This figure shows the proportion of workers with a disability separating relative to all workers separating in a given year for each agency. On either side of the introduction of quotas, we also show the predicted values of a (linear in time) model of representation. For non-targeted and targeted disabilities, there is a change in definition in 2017 which increased the number of disabilities categorized as targeted and decreased the number categorized as non-targeted.

Table 2. Did the mandate change disability trends?

Dependent Variable:	Disability rate (%)					
GS:	Lower			Upper		
Mandate binding in 2016:	Pooled	Binding	Not binding	Pooled	Binding	Not binding
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Trend (2017=0)	0.0068***	0.0039***	0.0093***	0.0050***	0.0036***	0.0126
	(0.0012)	(0.0007)	(0.0016)	(0.0012)	(0.0005)	(0.0062)
Post 2016	-0.0032	-0.0015	-0.0047	-0.0011	-0.0007	-0.0034
	(0.0030)	(0.0058)	(0.0030)	(0.0028)	(0.0027)	(0.0147)
Trend (2017=0) × Post 2016	-0.0052**	-0.0017	-0.0083**	-0.0005	0.0013	-0.0103
	(0.0018)	(0.0015)	(0.0026)	(0.0016)	(0.0010)	(0.0062)
Fixed-effects						
Agency	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	182	84	98	182	154	28
R^2	0.91219	0.81818	0.89068	0.87918	0.88994	0.90990
Within R^2	0.68822	0.64816	0.78425	0.73011	0.77303	0.90319

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 3. Did the mandate change targeted disability trends?

Dependent Variable:	Targeted disability rate (%)					
GS:	Lower			Upper		
Mandate binding in 2016:	Pooled	Binding	Not binding	Pooled	Binding	Not binding
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Trend (2017=0)	0.0003*	7.97×10^{-5}	0.0005*	0.0002***	0.0001***	0.0002
	(0.0002)	(0.0001)	(0.0003)	(3.83×10^{-5})	(4.27×10^{-5})	(9.29×10^{-5})
Post 2016	0.0162***	0.0130***	0.0191***	0.0145***	0.0132***	0.0216**
	(0.0012)	(0.0015)	(0.0009)	(0.0013)	(0.0012)	(0.0005)
Trend (2017=0) × Post 2016	-0.0008**	-0.0004	-0.0012*	-5.78×10^{-5}	8.14×10^{-5}	-0.0008***
	(0.0004)	(0.0004)	(0.0006)	(0.0002)	(0.0002)	(2.8×10^{-6})
Fixed-effects						
Agency	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	182	84	98	182	154	28
R^2	0.94463	0.92501	0.95951	0.93869	0.94622	0.99567
Within R^2	0.88168	0.89917	0.93337	0.92552	0.93173	0.99562

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 4. Did agencies respond to the mandate through hiring?

Dependent Variable:	Disability hiring rate (%)					
GS:	Lower			Upper		
Mandate binding in 2016:	Pooled	Binding	Not binding	Pooled	Binding	Not binding
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Trend (2017=0)	0.0085***	0.0037	0.0126**	0.0023	0.0026	0.0008
	(0.0026)	(0.0023)	(0.0041)	(0.0017)	(0.0020)	(0.0023)
Post 2016	-0.0359**	-0.0129	-0.0555*	-0.0077	-0.0100	0.0053
	(0.0149)	(0.0151)	(0.0230)	(0.0100)	(0.0116)	(0.0175)
Trend (2017=0) × Post 2016	-0.0064	0.0003	-0.0122*	0.0082***	0.0075***	0.0118*
	(0.0037)	(0.0022)	(0.0059)	(0.0018)	(0.0021)	(0.0017)
Fixed-effects						
Agency	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	182	84	98	182	154	28
R^2	0.68626	0.46872	0.66595	0.71539	0.69776	0.90485
Within R^2	0.13277	0.26343	0.17326	0.47795	0.42090	0.90161

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 5. Did agencies increase hiring of workers with a targeted disability?

Dependent Variable:	Targeted disability hiring rate (%)			
GS:	Lower			Upper
Mandate binding in 2016:	Pooled	Binding	Not binding	Binding
Model:	(1)	(2)	(3)	(4)
Variables				
Trend (2017=0)	0.0005	0.0003**	0.0010	4.05×10^{-5}
	(0.0003)	(0.0001)	(0.0015)	(4.58×10^{-5})
Post 2016	0.0035**	0.0021	0.0080	0.0007
	(0.0015)	(0.0013)	(0.0048)	(0.0009)
Trend (2017=0) × Post 2016	0.0002	0.0009***	-0.0022	0.0016***
	(0.0006)	(0.0002)	(0.0025)	(0.0004)
Fixed-effects				
Agency	Yes	Yes	Yes	Yes
Fit statistics				
Observations	182	140	42	182
R^2	0.80629	0.62446	0.57773	0.51210
Within R^2	0.39083	0.57455	0.30839	0.44791

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 6. Did agencies increase hiring of workers with a non-targeted disability?

Dependent Variable:	Nontargeted disability hiring rate (%)					
GS:	Lower			Upper		
Mandate binding in 2016:	Pooled	Binding	Not binding	Pooled	Binding	Not binding
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Trend (2017=0)	0.0047**	0.0017	0.0073**	0.0012	0.0013	0.0007
	(0.0017)	(0.0016)	(0.0027)	(0.0014)	(0.0016)	(0.0019)
Post 2016	-0.0246**	-0.0102	-0.0369**	-0.0059	-0.0068	-0.0014
	(0.0094)	(0.0095)	(0.0145)	(0.0083)	(0.0097)	(0.0116)
Trend (2017=0) × Post 2016	-0.0017	0.0021	-0.0051	0.0073***	0.0071***	0.0087
	(0.0022)	(0.0019)	(0.0034)	(0.0015)	(0.0018)	(0.0016)
Fixed-effects						
Agency	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	182	84	98	182	154	28
R^2	0.63243	0.53591	0.58501	0.68902	0.66335	0.89640
Within R^2	0.10718	0.22866	0.12675	0.43903	0.39104	0.89091

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table 7. Did the rate of separations change post mandate?

Dependent Variable:	Disability separation rate (%)					
GS:	Lower			Upper		
Mandate binding in 2016:	Pooled	Binding	Not binding	Pooled	Binding	Not binding
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
Trend (2017=0)	0.0078***	0.0039**	0.0111***	0.0046***	0.0034**	0.0114
	(0.0018)	(0.0011)	(0.0026)	(0.0014)	(0.0011)	(0.0053)
Post 2016	-0.0237***	-0.0156	-0.0306**	-0.0076	-0.0075	-0.0082
	(0.0069)	(0.0086)	(0.0106)	(0.0044)	(0.0050)	(0.0122)
Trend (2017=0) × Post 2016	-0.0038	0.0015	-0.0083	0.0014	0.0023	-0.0032
	(0.0029)	(0.0023)	(0.0046)	(0.0017)	(0.0018)	(0.0047)
Fixed-effects						
Agency	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	182	84	98	182	154	28
R^2	0.87537	0.79751	0.87567	0.81008	0.80077	0.89487
Within R^2	0.34641	0.36597	0.39927	0.49970	0.44358	0.88999

Clustered (Agency) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Figure 13. Disability codes

1987-2009 (1)	2010-2016 (2)	2017-2022 (3)
01 Not identified	01 Not identified	01 Not identified
05 No disability	05 No disability	05 No disability
06 Not listed disability	06 Not listed disability	06 Not listed disability
13 Speech impairment	13 Speech impairment	13 Speech impairment
15 Hard of hearing	15 Hard of hearing	**19 Hearing**
16 Deaf in one ear	**18 Deaf**	**19 Hearing**
17 Deaf in both ears	**18 Deaf**	**19 Hearing**
22 Tunnel vision	22 Tunnel vision	**20 Vision**
23 Inability to read	**21 Blind**	**20 Vision**
24 Blind in one eye	**21 Blind**	**20 Vision**
25 Blind in both eyes	**21 Blind**	**20 Vision**
27-38 Missing Extremities	26 Missing Extremities (one hand)	**31 Missing Extremities**
27-38 Missing Extremities	**30 Missing Extremities**	**31 Missing Extremities**
44-57 Nonparalytic impairment	44 Nonparalytic impairment	44 Nonparalytic impairment
61-63 Partial paralysis	61 Partial paralysis (one hand)	**60 Partial or complete paralysis**
64-68 Partial paralysis	**69 Partial paralysis**	**60 Partial or complete paralysis**
70 Complete paralysis	70 Complete paralysis (one hand)	**60 Partial or complete paralysis**
71-78 Complete paralysis	**79 Complete paralysis**	**60 Partial or complete paralysis**
80-81 Heart disease	80 Heart disease	80 Heart disease
82 Convlusive disorder	**82 Epilepsy**	**82 Epilepsy**
83 Blood disease	83 Blood disease	83 Blood disease
84 Diabetes	84 Diabetes	84 Diabetes
86 Pulmonary condition	86 Pulmonary condition	86 Pulmonary condition
87 Kidney dysfunction	87 Kidney dysfunction	87 Kidney dysfunction
88-89 Cancer	88 Cancer	88 Cancer
90 Intellectual disability	**90 Intellectual disability**	**90 Intellectual disability**
91 Mental illness	**91 Psychiatric disability**	**91 Psychiatric disability**
92 Severe distortion	**92 Dwarfism**	**92 Dwarfism**
93 Disfigurement	93 Disfigurement	**93 Disfigurement**
94 Learning disability	94 Learning disability	94 Learning disability
	40 Mobility Impairment	**40 Mobility Impairment**
	41 Spinal	41 Spinal abnormalities
	51 HIV/AIDS	51 HIV/AIDS
	52 Morbid obesity	52 Morbid obesity
	95 Gastrointestinal disorder	95 Gastrointestinal disorder
	98 Alcoholism	98 Alcoholism
		02 Developmental disability
		03 Traumatic brain injury
		59 Nervous system disorder
		81 Depression
		85 Orthopedic impairment
		96 Autoimmune disorder
		97 Liver disease
		99 Endocrine disorder

Notes: This table shows the changes in disability codes available for workers to choose across time. The code is the number to the left and the description is to the right. The gray and white shading represents different groupings of disability codes. For example: hard of hearing, deaf in one ear, deaf in both ears, deaf and hearing are all related to hearing problems. Bolded text represents a targeted disability by the definition of EEOC. Targeted disabilities began in the 2010-2015 form and later added additional targeted disabilities in 2016. Disability codes that were added are at the bottom of the table. For example: morbid obesity was not an available option in the 1987-2009 form so individuals would have to choose "06 Not listed disability" if they chose to reveal their disability.

APPENDIX

RETIREMENT, RETENTION, RECRUITMENT: EVIDENCE FROM A FEDERAL PENSION POLICY

A.1 OPM Transition Table

Table A.8. OPM Nonforeign Locality and COLA Rates 2009-2015

	2009		2010			2011			2012-2015		
Region	**COLA**	**Locality**	**COLA**	**Payable Locality**	**Full Locality**	**COLA**	**Payable Locality**	**Full Locality**	**COLA**	**Payable Locality**	**Full Locality**
Anchorage, Alaska	23	0	19.03	4.72	14.16	10.56	16.46	24.69	5.57	24.69	24.69
Fairbanks, Alaska	23	0	19.03	4.72	14.16	10.56	16.46	24.69	5.57	24.69	24.69
Juneau, Alaska	23	0	19.03	4.72	14.16	10.56	16.46	24.69	5.57	24.69	24.69
Other Alaska	25	0	20.94	4.72	14.16	12.28	16.46	24.69	7.18	24.69	24.69
County of Honolulu, Hawaii	25	0	20.94	4.72	14.16	16.07	11.01	16.51	12.25	16.51	16.51
County of Hawaii, Hawaii	18	0	14.26	4.72	14.16	9.76	11.01	16.51	6.24	16.51	16.51
County of Kauai, Hawaii	25	0	20.94	4.72	14.16	16.07	11.01	16.51	12.25	16.51	16.51
County of Maui, Hawaii	25	0	20.94	4.72	14.16	16.07	11.01	16.51	12.25	16.51	16.51
Puerto Rico	14	0	10.44	4.72	14.16	7.18	9.44	14.16	4.2	14.16	14.16
U.S. Virgin Islands	25	0	20.94	4.72	14.16	17.23	9.44	14.16	13.84	14.16	14.16
Guam Northern Mariana Islands	25	0	20.94	4.72	14.16	17.23	9.44	14.16	13.84	14.16	14.16
Other Possessions	0	0	0	4.72	14.16	0	9.44	14.16	0	14.16	14.16

Notes: Column entries are percentages.

A.2 OPM Pension Calculation

A.2.1 High-Three Average Salary. By definition of OPM: "High-three average salary is figured by averaging the highest basic pay over any three consecutive service."

Consider a government worker with salary S who works in Alaska. They are to receive a series of basic pay shocks. Starting in 2010, they receive a growth in basic pay of $X\%$. Taking an average at the end of 2010, that worker would have a "high-3" average salary of:

$$\frac{S + S + S * (1 + X)}{3}$$

The following year, with a growth in basic pay of $Y\%$, that worker would have a "high-3" average salary of

$$\frac{S + S * (1 + X) + S * (1 + Y)}{3}$$

The following year, with a growth in basic pay of $Z\%$, that worker would have a "high-3" average salary of

$$\frac{S * (1 + X) + S * (1 + Y) + S * (1 + Z)}{3}$$

The following year, with no growth, that worker would have a "high-3" average salary of

$$\frac{S * (1 + Y) + S * (1 + Z) + S * (1 + Z)}{3}$$

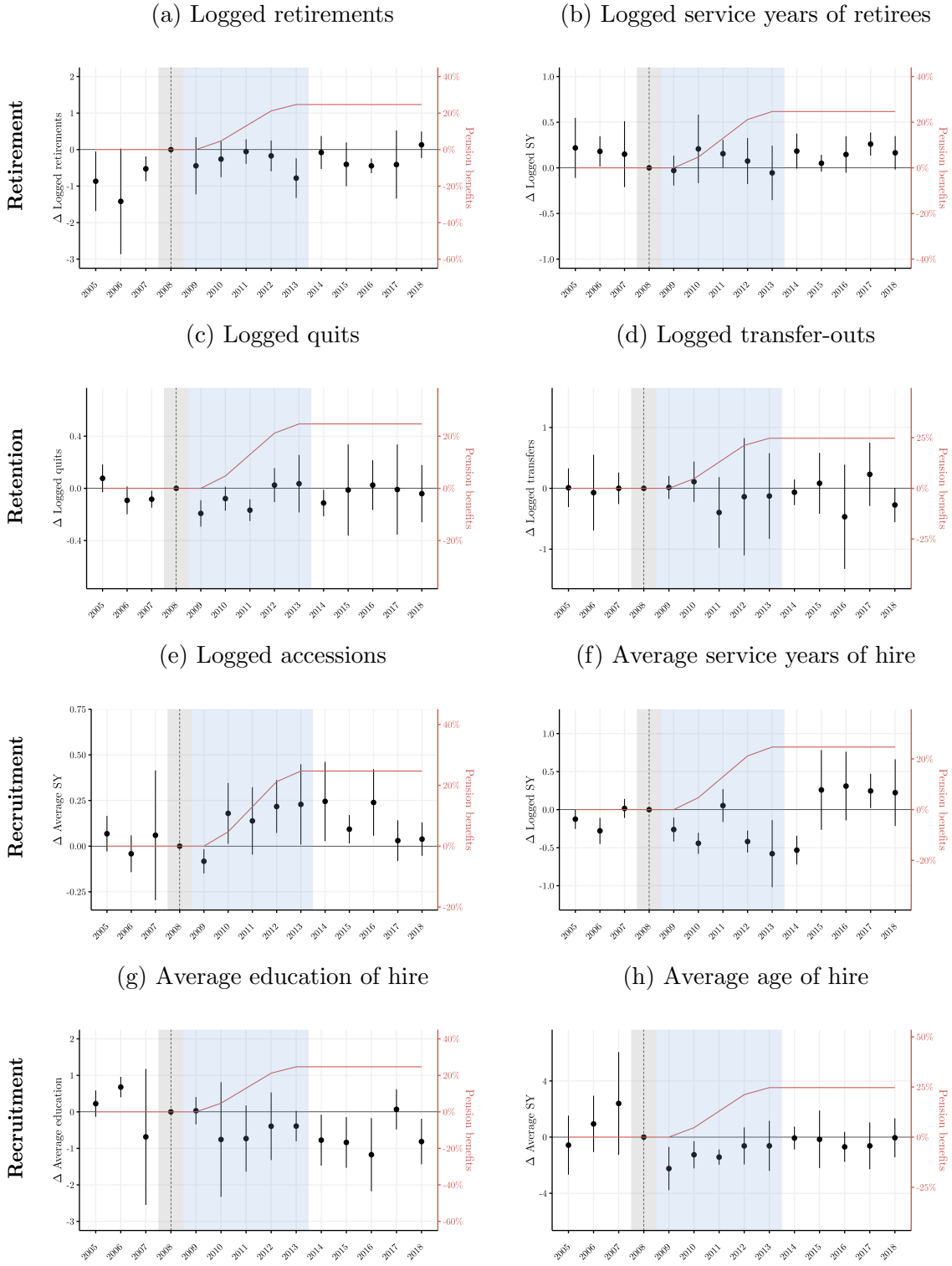
The following year, with no growth, that worker would have a "high-3" average salary of

$$\frac{S * (1 + Z) + S * (1 + Z) + S * (1 + Z)}{3}$$

A.2.2 CSRS Pension Accrual. The accrual rate for workers under the CSRS system is as follows:

$$\text{Pension Accrual} = \begin{cases} 1.5\% \times \text{High-Three Average Salary}, & \text{First five service years} \\ 1.75\% \times \text{High-Three Average Salary}, & \text{Second five service years} \\ 2\% \times \text{High-Three Average Salary}, & \text{All remaining years} \end{cases} \tag{A.1}$$

Figure A.14. Effect of pension generosity on outcomes - temporary workers



Notes: The gray shaded area represents the year the policy was passed in. The blue shaded area represents when the pension generosity was increasing.

Table A.9. Event Study – Alaska and Hawaii

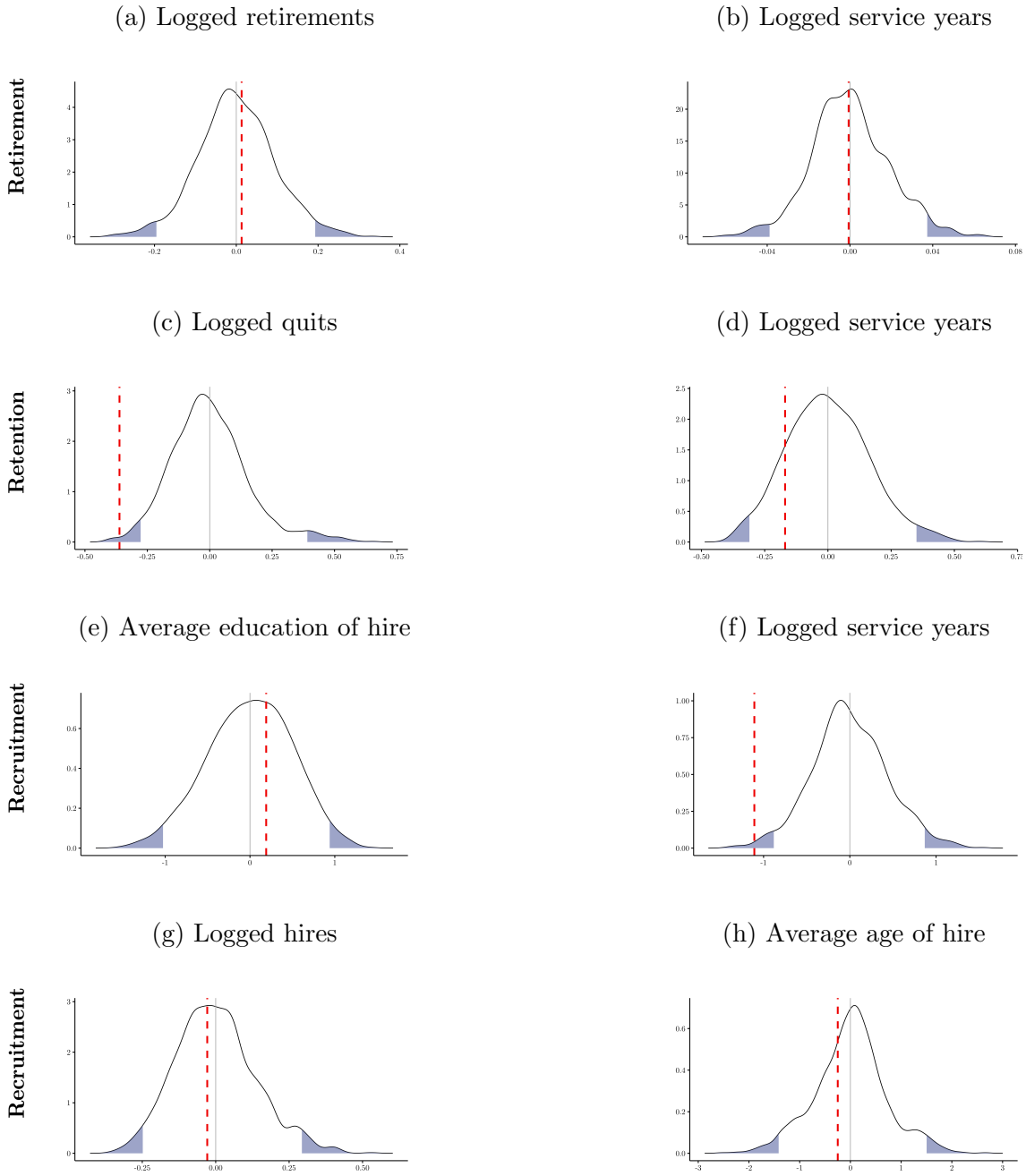
Group:	Retirement		Retention		Recruitment			
Dependent Variables:	log(Retirements)	log(SY)	log(Quits)	log(Transfers)	log(Hires)	Mean SY	Mean Ed	Average age of hire
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
Treat × Year = 2005	-0.07 (0.06)	0.05 (0.05)	-0.09 (0.11)	0.05 (0.13)	-0.11 (0.14)	0.07 (1.1)	-0.10 (0.25)	1.0 (1.5)
Treat × Year = 2006	0.03 (0.10)	0.01 (0.04)	0.06 (0.10)	0.14** (0.04)	0.13 (0.21)	-0.17 (0.22)	-0.06 (0.19)	0.36 (0.67)
Treat × Year = 2007	0.06 (0.05)	0.01 (0.05)	0.04 (0.12)	0.15* (0.06)	0.16 (0.08)	0.03 (0.73)	-0.70*** (0.13)	0.24 (1.4)
Treat × Year = 2009	-0.16*** (0.02)	-0.05*** (0.007)	0.05 (0.05)	0.18** (0.06)	-0.007 (0.14)	-0.39 (0.51)	-1.6*** (0.11)	0.50 (1.0)
Treat × Year = 2010	-0.31*** (0.05)	-0.08* (0.04)	-0.16 (0.11)	0.06 (0.14)	-0.01 (0.10)	-1.3*** (0.24)	0.14 (0.27)	0.62* (0.26)
Treat × Year = 2011	-0.22** (0.08)	0.005 (0.05)	-0.11* (0.05)	-0.16 (0.25)	0.21 (0.14)	-1.1 (0.62)	0.09 (0.36)	0.09 (0.96)
Treat × Year = 2012	0.97*** (0.06)	0.09*** (0.02)	-0.25*** (0.05)	0.22* (0.11)	0.08 (0.31)	-1.5*** (0.28)	-0.97*** (0.17)	0.11 (2.4)
Treat × Year = 2013	-0.52*** (0.06)	-0.13*** (0.006)	-0.30** (0.11)	0.18 (0.18)	0.07 (0.16)	-0.66 (0.49)	-1.0 (0.63)	-0.43 (1.1)
Treat × Year = 2014	-0.02 (0.09)	0.008 (0.03)	-0.26*** (0.06)	-0.03 (0.11)	-0.11 (0.21)	-1.3*** (0.20)	-0.28 (0.39)	0.45 (0.24)
Treat × Year = 2015	0.17 (0.10)	0.03 (0.03)	-0.31*** (0.06)	-0.08 (0.10)	-0.08 (0.27)	-0.43 (1.2)	-0.27 (0.15)	1.1 (0.96)
Treat × Year = 2016	-0.007 (0.03)	0.02 (0.03)	-0.47*** (0.07)	0.11 (0.27)	0.09* (0.05)	-0.69 (0.94)	-0.01 (0.37)	-0.009 (0.37)
Treat × Year = 2017	-0.08 (0.06)	-0.003 (0.05)	-0.39*** (0.09)	-0.36 (0.21)	0.21** (0.07)	-1.7*** (0.35)	0.30 (0.37)	-0.86 (0.63)
Treat × Year = 2018	0.01 (0.08)	0.03 (0.04)	-0.37*** (0.09)	-0.08 (0.28)	-0.03 (0.05)	-1.5 (1.0)	0.15 (0.16)	0.05 (0.64)
Fixed-effects								
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics								
Observations	714	714	714	714	714	714	714	714
R^2	0.98788	0.67504	0.97544	0.96610	0.97356	0.68218	0.65883	0.63861
Within R^2	0.20572	0.11262	0.03264	0.01486	0.01085	0.03335	0.02744	0.00712

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.10. Education levels

Years of Education	Description
01	No formal education or some elementary school - did not complete
02	Elementary school completed - no high school
03	Some high school - did not complete
04	High school graduate or certificate of equivalency
05	Terminal occupational program - did not complete
06	Terminal occupational program - certificate of completion, diploma or equivalent
07	Some college - less than one year
08	One year college
09	Two years college
10	Associate degree
11	Three years college
12	Four years college
13	Bachelor's degree
14	Post-bachelor's
15	First professional
16	Post-first professional
17	Master's degree
18	Post-master's
19	Sixth-year degree
20	Post-sixth year
21	Doctorate degree
22	Post-doctorate
**	**-Unspecified
	No education level reported

Figure A.15. Placebo tests



Notes: To compute a placebo test, I use the pre-post model specified in the econometric framework. I then randomly sample by choosing two states to be treated and compare them to the other 48 states. I create a distribution from the results and compute the significance of the effect sizes observed from Alaska and Hawaii.

Table A.11. Retirements by age

Dependent Variable:	log(Retirements)		
	55-59	60-64	65+
Model:	(1)	(2)	(3)
Variables			
Treat × Time = 1	-0.05	0.02	-0.007
	(0.03)	(0.04)	(0.04)
Fixed-effects			
State	Yes	Yes	Yes
Time	Yes	Yes	Yes
Fit statistics			
Observations	459	459	459
R^2	0.97021	0.97533	0.96812
Within R^2	0.00055	7.93×10^{-5}	9.93×10^{-6}

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.12. Service years of retirees by age

Dependent Variable:	log(SY)		
	55-59	60-64	65+
Model:	(1)	(2)	(3)
Variables			
Treat × Time = 1	0.04	-0.02	-0.09***
	(0.03)	(0.02)	(0.03)
Fixed-effects			
State	Yes	Yes	Yes
Time	Yes	Yes	Yes
Fit statistics			
Observations	459	459	459
R^2	0.39877	0.45570	0.37116
Within R^2	0.01541	0.00120	0.01118

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.13. Logged quits by service years

Dependent Variable:	log(Quits)				
	0 - 4 years	5 - 9 years	10 - 14 years	15 - 19 years	20 - 50 years
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Treat × Time = 1	-0.26*	-0.50***	-0.46**	-0.31***	-0.06
	(0.11)	(0.05)	(0.17)	(0.05)	(0.12)
Fixed-effects					
State	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	459	458	459	454	459
R^2	0.95549	0.95089	0.90869	0.86498	0.87832
Within R^2	0.01072	0.03640	0.01785	0.00577	0.00024

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.14. Logged transfers by service years

Dependent Variable:	log(Transfers)				
	0 - 4 years	5 - 9 years	10 - 14 years	15 - 19 years	20 - 50 years
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Treat × Time = 1	-0.04	-0.32	-0.21	0.06	-0.09
	(0.23)	(0.16)	(0.24)	(0.12)	(0.08)
Fixed-effects					
State	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	459	458	459	454	459
R^2	0.91879	0.90616	0.90172	0.89051	0.89536
Within R^2	8.93×10^{-5}	0.00656	0.00296	0.00021	0.00043

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.15. Logged hires by service years

Dependent Variable:	log(Hires)				
	0 - 4 years	5 - 9 years	10 - 14 years	15 - 19 years	20 - 50 years
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
Treat × Time = 1	0.08	-0.37*	-0.36***	-0.21	-0.04
	(0.05)	(0.17)	(0.08)	(0.25)	(0.05)
Fixed-effects					
State	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	459	456	454	442	435
R^2	0.94862	0.92252	0.91021	0.88440	0.87663
Within R^2	0.00094	0.01070	0.00884	0.00239	7.95×10^{-5}

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

Table A.16. Logged hires by age

Dependent Variable:	log(Hires)										
	18-20	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-80
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Variables											
Treat × Time = 1	-0.10	-0.05	-0.005	0.02	0.04	-0.13	-0.08	-0.15	0.10	-0.32	0.18
	(0.10)	(0.09)	(0.11)	(0.09)	(0.20)	(0.08)	(0.16)	(0.09)	(0.17)	(0.32)	(0.25)
Fixed-effects											
State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics											
Observations	305	458	459	458	458	459	457	458	448	419	324
R^2	0.57333	0.90094	0.91826	0.93982	0.93785	0.92805	0.91675	0.90804	0.90374	0.80674	0.75635
Within R^2	8.84×10^{-5}	0.00020	2.06×10^{-6}	5.82×10^{-5}	0.00019	0.00164	0.00051	0.00146	0.00080	0.00364	0.00121

Clustered (State) standard-errors in parentheses
*Signif. Codes: ***: 0.001, **: 0.01, *: 0.05*

A.3 Job Annoucement

Administrative Support Assistant

DEPARTMENT OF AGRICULTURE
Forest Service

Summary

Positions filled through this announcement provide and/or advise on a variety of administrative management services.

This is an open and continuous announcement. See Additional Information section for more information.

Applications will expire every 90 days. To remain active for consideration, applicants **must** resubmit their application.

Overview

Accepting applications

Open & closing dates
05/01/2023 to 09/29/2023

Salary
$20.36 - $22.70 per hour

Pay scale & grade
GS 5 - 6

Locations
Few vacancies in the following locations:

- **Anchorage, AK**
- **Cordova, AK**
- **Craig, AK**
- **Girdwood, AK**
- **Hoonah, AK**
- **Juneau, AK**
- **Ketchikan, AK**
- **Moose Pass, AK**
- **Petersburg, AK**
- **Sitka, AK**
- **Thorne Bay, AK**
- **Wrangell, AK**
- **Yakutat, AK**

Remote job
No

Telework eligible
Yes—as determined by the agency policy.

Travel Required
Not required

Relocation expenses reimbursed
No

Appointment type
Permanent -

Work schedule
Full-time -

Service
Excepted

Promotion potential
8 - The target grade of positions filled through this announcement may be 06, 07, or 08. Target grade will be determined at the time of the job offer.

Job family (Series)
0303 Miscellaneous Clerk And Assistant
(/Search/Results?j=0303)

Supervisory status
No

Security clearance
Not Required
(/Help/faq/job-announcement/security-clearances/)

Drug test
No

Position sensitivity and risk
Non-sensitive (NS)/Low Risk
(https://www.usajobs.gov/Help/faq/job-announcement/security-clearances/)

Trust determination process
Credentialing
(https://www.usajobs.gov/Help/faq/job-announcement/security-clearances/)
Suitability/Fitness
(https://www.usajobs.gov/Help/faq/job-announcement/security-clearances/)

Announcement number
23-R10OCR-ASA-0303-5-8-AP

Control number
722808800

This job is open to

The public
U.S. Citizens, Nationals or those who owe allegiance to the U.S.

Clarification from the agency

Anyone who has lived or worked in or near the geographic boundaries of the Chugach National Forest or Tongass National Forest and has special knowledge or expertise concerning the cultural and/or resources of the Southcentral or Southeast Alaska area may apply.

Duties

- Duties are described for the minimum performance level, GS-06.
- The position receives visitors and handles calls of a routine nature, such as locations of key personnel, local amenities, subsistence opportunities and regulations, tourism, fishing, hunting and recreation opportunities.
- Provides administrative support in the specialized area or program the unit/staff supports.
- Responsible for the administrative oversight of various business processes, which may include processing financial, procurement, property, personnel, and other administrative instruments for the unit/staff.
- Determines overall file methods, plans and systems, use of files equipment, preservation of records of continuing value and the systematic elimination of all other records.
- From rough drafts, notes, or oral instructions, prepares correspondence, forms, reports and other documents with a wide variety of technical terminology.
- Performs miscellaneous and other clerical services, such as applying postal regulations to out-going mail.
- Performs other duties as assigned.

Requirements

Conditions of Employment

- Must be a U.S. Citizen or National.
- Males born after 12-31-59 must be registered for Selective Service or exempt.
- Subject to satisfactory adjudication of background investigation and/or fingerprint check.
- Successful completion of a 2-year probationary period is required.
- Per Public Law 104-134 all Federal employees are required to have federal payments made by direct deposit to their financial institution.

- Successfully pass the E-Verify employment verification check. To learn more about E-Verify, including your rights and responsibilities, visit E-Verify.

Qualifications

You must meet the ANILCA eligibility requirements to be referred for this position.

Eligibility Requirements: You must have lived and or worked in or near the geographic boundaries of the Chugach National Forest or Tongass National Forest a and have special knowledge or expertise concerning the natural and cultural resources in Southcentral or Southeast area to participate in visitor services and administrative activities.

Your responses to the questions in the assessment for this announcement must clearly show that you meet the eligibility requirements.

Education

These jobs do not have an education qualification requirement.

Additional information

The salary amount will be adjusted to include a Cost of Living Allowance (COLA)
(https://www.opm.gov/policy-data-oversight/pay-leave/pay-systems/nonforeign-areas/#url%3DCOLA-Rates)
. A gradually reducing COLA will continue to be paid after December 31, 2012. COLA will not be eliminated until 65% of the locality pay equals the frozen COLA rate. See the OPM website at:
http://www.opm.gov/oca/cola/index.asp
(http://www.opm.gov/oca/cola/index.asp%20)
for additional information.

Positions may be filled at one or more of the duty locations included in this announcement.

THIS IS AN OPEN CONTINUOUS ANNOUNCEMENT. This type of announcement provides the Forest Service with a readily available source of applicants when vacancies occur. Eligibility and qualifications will be verified when there is a vacancy for the location and grade for which you applied. Information on specific locations where jobs are being filled and the dates when applications are due for these locations can be found on the Forest Service
(http://fsoutreach.edcii.com/Outreach)
website.

The Forest Service may use certain incentives and hiring flexibilities, currently offered by the Federal government, to attract highly qualified candidates. Additional information is available at
https://www.opm.gov/policy-data-oversight/pay-leave/pay-and-leave-flexibilities-for-recruitment-and-retention/
(https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.opm.gov%2Fpolicy-data-oversight%2Fpay-leave%2Fpay-and-leave-flexibilities-for-recruitment-and-retention%2F&data=04%7C01%7C%7C0096aa46019848889l6d08d915428378%7Ced5b36e701ee4ebc867ee03cfa0d4697%7C0%7C0%7C637564198105039832%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2lUMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn%3D%7C1000&sdata=%2BV1RU2IUq%2FCwobYcZze4oDFzXHtpx2EEu6fsB5MRuDAI%3D&reserved=0)

These are bargaining unit positions and are represented by NFFE.

Government housing may be available, depending on location.

Federal affiliated daycare facilities may be available, depending on location.

This position may be eligible to telework up to four days per week, based upon the duties of the position. This position may also be eligible for flexible work arrangements as determined by agency policy and any applicable collective bargaining agreements.

If you are selected for a position with further promotion potential, you will be placed under a career development plan, and may be non-competitively promoted if you successfully complete the requirements and if recommended by management. However, promotion is not guaranteed.

ANILCA appointments require a 2 year probationary period. Upon completion of 2 years the incumbent will be non-competitively converted to a career or career-conditional appointment if all of the following are met: successful completion of 2 year probationary period, Office of Personnel Management (OPM) qualification requirements are met for the position the incumbent is converting into, satisfactorily meeting performance requirements, and completion of all prescribed training. If all requirements are not met upon completion of two years in this position, employment will be terminated.

Benefits

A career with the U.S. government provides employees with a comprehensive benefits package. As a federal employee, you and your family will have access to a range of benefits that are designed to make your federal career very rewarding. Learn more about federal benefits
(https://www.usajobs.gov/Help/working-in-government/benefits/)
.

Eligibility for benefits depends on the type of position you hold and whether your position is full-time, part-time or intermittent. Contact the hiring agency for more information on the specific benefits offered.

How You Will Be Evaluated

You will be evaluated for this job based on how well you meet the qualifications above.

You will be evaluated for this job based on your responses to the questions in the assessment to determine whether or not you are eligible for appointment under the ANILCA authority.

Note: Please follow all instructions carefully. Errors or omissions may affect your eligibility. Providing inaccurate information on Federal documents could be grounds for non-selection or disciplinary action up to including removal from the Federal service.

To view the application form, visit: https://apply.usastaffing.gov/ViewQuestionnaire/11950252

Required Documents

The following documents are required for your applicant package to be complete. Our office cannot be responsible for incompatible software, illegible fax transmissions, delays in the mail service, your system failure, etc. Encrypted documents will not be accepted. Failure to submit required, legible documents may result in loss of consideration.

Resume that includes: 1) personal information such as name, address, contact information; 2) education; 3) detailed work experience related to this position as described in the responsibilities section including work schedule, hours worked per week, dates of employment; title, series, grade (if applicable); 4) supervisor's phone number and whether or not the supervisor may be contacted for a reference check; 5) other qualifications.

If claiming veteran's preference, you must submit a DD214, Certificate of Release from Active Duty, which shows dates of service and discharge under honorable conditions. If currently on active duty you must submit a certification of expected discharge or release from active duty service under honorable conditions not later than 120 days after the date the certification is submitted. Veteran's preference must be verified prior to appointment. Without this documentation, you will not receive veteran's preference and your application will be evaluated based on the material(s) submitted.

If claiming 10-point veteran's preference you must provide the DD214 or certification requirements (see above bullet), plus the proof of entitlement of this preference as listed on the SF-15 Application for 10-point Veterans' Preference. The SF-15 should be included but is not required. Failure to submit these documents could result in the determination that there is insufficient documentation to support your claim for 10-point preference. For more information on veterans' preference visit FEDSHIREVETS
(https://www.fedshirevets.gov/job-seekers/veterans-preference/#content)
.

How to Apply

Please view Tips for Applicants
(https://www.fs.usda.gov/working-with-us/jobs/how-to-apply)
- a guide to the Forest Service application process.

Read the entire announcement and all instructions before you begin. You must complete this application process and submit all required documents electronically by 11:59p.m. Eastern Time (ET) on the closing date of this announcement.

Applying online is highly encouraged. We are available to assist you during business hours (8:00a.m. - 4:00p.m. (MST), Monday - Friday. If applying online poses a hardship, contact the Agency Contact listed below well before the closing date for an alternate method. All hardship application packages must be returned to Human Resources no later than noon ET on the closing date of the announcement in order for it to be entered into the system prior to the closing date.

This agency provides reasonable accommodation to applicants with disabilities on a case-by-case basis. Contact the Agency Contact to request this.

To begin, in USAJOBS click "Apply" and follow the instructions to attach your resume and required documents, complete the assessment questionnaire, and submit your application.

NOTE: Please verify that documents you are uploading from USAJOBS transfer into the Agency's staffing system as there is a limitation to the number of documents that can be transferred. However, once in the Agency's staffing system, you will have the opportunity to upload additional documents. Uploaded documents must be less than 5MB and in one of the following document formats: GIF, JPG, JPEG, PNG, RTF, PDF, TXT or Word (DOC or DOCX). Do not upload Adobe Portfolio documents because they are not viewable.

Agency contact information

HRM Contact Center

Phone

1-877-372-7248 X2
(tel:1-877-372-7248 X2)

Email

HRM_Contact_Center@usda.gov
(mailto:HRM_Contact_Center@usda.gov)

Learn more about this agency
(#agency-modal-trigger)

Address

USDA Forest Service HRM Contact Center
DO NOT MAIL IN APPLICATIONS, SEE INSTRUCTIONS IN THE ANNOUNCEMENT.
Albuquerque, NM 87109
US

Next steps

Your application will be reviewed to verify that you meet the eligibility and qualification requirements for the position prior to issuing referral lists to the selecting official. If further evaluation or interviews are required, you will be contacted. Log in to your USAJOBS
(https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.usajobs.gov%2F&data=04%7C01%7C%7C198596a2ef624eeca92608d95e63056b%7Ced5b36e701ee4ebc867ee03cfa0d4697%7C0%7C0%7C637644601643425378%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C1000&sdata=XaGoNbQyufnXvLMx%2BPQKv36jMnfDcECQUVHLrnjk6Iws%3D&reserved=0)
account to check your application status.

You must choose to turn on email notifications in your USAJOBS profile if you want to receive important email notifications that may impact your applicant experience (e.g. If you start an application and do not submit it prior to the closing date, USAJOBS will send an email reminder that the closing date is approaching and your application is in an incomplete status).

Multiple positions may be filled from this announcement.

Fair & Transparent

The Federal hiring process is set up to be fair and transparent. Please read the following guidance.

Equal Employment Opportunity (EEO) Policy
(/Help/equal-employment-opportunity/)
Financial suitability
(/Help/working-in-government/fair-and-transparent/financial-suitability/)
New employee probationary period
(/Help/working-in-government/fair-and-transparent/probationary-period/)
Privacy Act
(/Help/working-in-government/fair-and-transparent/privacy-act/)
Reasonable accommodation policy
(/Help/reasonable-accommodation/)
Selective Service
(/Help/working-in-government/fair-and-transparent/selective-service/)
Signature and false statements
(/Help/working-in-government/fair-and-transparent/signature-false-statements/)
Social security number request
(/Help/working-in-government/fair-and-transparent/social-security-number/)

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