April 18th, 2022

Distinguished Committee Members

The Review of Economics and Statistics (RESTAT) Editorial Board

Thank you for reviewing my application for the RESTAT Fellowship for NBER Summer Institute. This opportunity could be a stepping-stone toward a successful research career. The benefits of attending the NBER Summer Institute cannot be overemphasized. Exposure to research and quality presentations was instrumental for the development of my research skills and helped me explore new methods and data sources. Having been an NBER pre-doctoral fellow, I had the opportunity to attend the last in-person Summer Institute in 2019. It was an opportunity for me to get critical feedback on my first piece of research, that is now under a 2nd round of revise and resubmit for the Journal of Public Economics. I hope the opportunity to attend the Summer Institute again could help me develop more papers and would also be a good return on investment for your Board.

I graduated with a Doctorate in Economics from Georgia State University in January 2021. Currently, I do not hold any institutional affiliation with a U.S. entity. I am also not a U.S. citizen or resident. However, I believe the goals I pursue are aligned with the spirit of your fellowship. I see this as an opportunity to learn new ideas, get feedback on my papers, establish new connections and meet potential co-authors. Ultimately, these efforts gradually serve my goal of getting a research-oriented position at a major university or international organization, an ambition I am still passionate about and relentlessly working to achieve.

Attending the Aging, Public Economics, Labor Studies and the Economics of Social Security sessions would be of great interest to me. In my research, I estimate the negative effects of late-career layoffs on older workers' 401(k) savings and Social Security claiming. I then estimate the effects of the removal of the Early Withdrawal Penalty on 401(k) withdrawals upon job loss. I also show that unemployment insurance mitigates these negative effects of job loss on retirement savings, leading to increased 401(k) retirement income and delayed Social Security claiming. In my second line of research, I contribute to a growing body of literature on climate-related financial risks and the effects of extreme weather events on financial institutions and the real economy.

Kindly find attached my curriculum vitae including the abstracts for my two papers. I have also attached my research on retirement savings for your consideration. Should you have further interest in my research, do not hesitate to contact me at: sam.elsadek@gmail.com.

Sincerely Yours,

samir

Samir E. Mahmoudi

SAMIR E. MAHMOUDI

sam.elsadek@gmail.com

Education

PhD in Economics. *2015 to 2021*
Dissertation Title: *Essays on Financial and Public Economics.*
Dissertation Chair: Thomas A. Mroz

M.A. in Economics. *Fall 2017*
Georgia State University, Atlanta

MSc in Economics *Spring 2013*
Faculty of Economics and Political Science, Cairo University, Egypt

Bachelor of Electronics and Communications Engineering *Spring 2007*
Faculty of Engineering, Cairo University, Egypt

Fields of Interest

Public and Financial Economics.
Economics of an Aging Workforce, Retirement and Pensions, Household Finance.
Financial Networks and Spillovers, Climate-related Financial Risks, Real Estate Finance.

Research Papers

Late-career Unemployment Shocks, Pension Outcomes and Unemployment Insurance.

Second Round R & R: Journal of Public Economics

Rising Financial Literacy Scholar Award; GFLEC, George Washington University

The 2021 John Heinz Dissertation Award (Honorable Mention); National Academy of Social Insurance

Funded by the Alfred P. Sloan Foundation through the National Bureau of Economic Research (NBER) Pre-Doctoral Fellowship on the Economics of an Aging Workforce

In response to unemployment shocks, older workers deplete their 401(k)s, particularly after the waiving of the early withdrawal penalty on unemployment-motivated withdrawals at age 55. This paper shows that Unemployment Insurance (UI) keeps older workers from depleting their 401(k) assets following job losses. UI also incentivizes older unemployed workers to delay claiming their Social Security (SS) benefits beyond the earliest age of eligibility, 62. Overall, UI enhances the retirement income of the individuals having a history of late-career layoffs by helping them preserve their 401(k) assets, the return on these assets and opt for a higher stream of SS benefits.

Presented at: the Presidential Session of the Southern Economic Association Meeting 11/2019, the Ageing and Financial Markets Conference (Zew Mannheim: 2/2021), the Royal Economic Society (4/2021), the Annual Conference of the Society of Labor Economists (5/2021) and Cherry Blossom Financial Education Institute (GWU, April 2021).

Financial Networks and the Inter-regional Sharing of Climate Risks: Evidence from Hurricane Katrina.

Homer Hoyt Doctoral Dissertation Award

BlackRock Applied Research Award 2020 (Finalist)

Kuldeep Shastri Outstanding Doctoral Paper: Eastern Finance Association

This paper shows that the costs of local climate shocks are shared nationwide. Hurricane Katrina, a seemingly local shock, triggered a sequence of events leading to a negative housing market shock across the undamaged regions in the U.S. Driven by abnormal mortgage and housing activities in Katrina-damaged areas, lenders intensified their loan supply in Katrina markets leading to a credit tightening in the undamaged regions, which responded with housing prices and construction declines. These spillovers depended on the undamaged areas' financial linkages to disaster areas. Using this exogenous credit tightening, I estimate the elasticity of housing prices to interest rates.

Presented at: Federal Housing Finance Agency (planned), Second Conference on the Interconnectedness of Financial Systems (Federal Reserve Board, Scheduled 12/2021), Federal Reserve Bank of San Francisco 2021 Climate Risk Virtual Workshop, Case Western Reserve University, University of Essex, BlackRock Applied Research Award Seminar (12/2020), Virtual Junior Household Finance Brownbag (Scheduled 12/2021), the International Banking, Economics and Finance Association (IBEFA/ASSA) meetings (1/2021), the American Real Estate and Urban Economics Association (AREUEA) Virtual Seminar series (1/2021), the 2020 Winter Meeting of the Econometric Society (Scheduled 12/2020), the 12th Real Estate Markets and Capital Markets (ReCapNet) Conference (ZEW Mannheim; 11/2020), the 2020 Community Banking in the 21st Century Research and Policy Conference (9/2020), the 2020 Virtual Meeting of the Urban Economics Association (10/2020), the Eastern Finance Association Annual Meeting (4/2021) & the 2021 Ohio State PhD Real Estate Conference (4/2021).

Research Funding, Honors and Awards

Homer Hoyt Doctoral Dissertation Award. *January 2022*
American Real Estate and Urban Economics Association.

Rising Financial Literacy Scholar Award.
Cherry Blossom Financial Education Institute.
Global Financial Literacy Excellence Center, George Washington University *April 2021*

Kuldeep Shastri Outstanding Doctoral Paper.
Eastern Finance Association *February 2021*

BlackRock Applied Research Award (Finalist). *December 2020*

The 2021 John Heinz Dissertation Award from the National Academy of Social Insurance.
(Honorable Mention) *March 2021*

Pre-Doctoral Fellow of the National Bureau of Economic Research (NBER)
on the Economics of an Aging Workforce. *2019-2020*

National Association for Business Economics (NABE) Foundation Scholarship for the NABE Economic Policy Conference. *February 2020*

International Monetary Fund Internship Program. *Summer 2018*

Fellow of the Center for the Economic Analysis of Risk, Georgia State University. *2018 -2019*

Graduate student full scholarship, Georgia State University. *August 2015 - January 2021*

Institute of Electrical and Electronics Engineers / IEEE Egypt Award of the Egyptian Engineering Day 2007 for the best engineering graduation project in Egypt. *Summer 2007*

Seminars Presentations

2022: Federal Housing Finance Agency (planned).

2021: Second Conference on the Interconnectedness of Financial Systems (Federal Reserve Board, 12/2021), Federal Reserve Bank of San Francisco 2021 Climate Risk Virtual Workshop, Junior Household Finance Seminar, Case Western Reserve University, University of Essex, Society of Labor Economists, Cherry Blossom Financial Education Institute (George Washington University School of Business), Eastern Finance Association (April 2021: Best Doctoral Papers Session), the International Banking, Economics and Finance Association *IBEFA/ASSA*, the American Real Estate and Urban Economics Association *AREUEA* Virtual Seminar series, the *Ageing and Financial Markets* conference (ZEW Mannheim), the Royal Economic Society, the Annual Conference of the Society of Labor Economists and the 2021 Ohio State PhD Real Estate Conference.

2020: *BlackRock Applied Research Award* Seminar, the 12th Real Estate Markets and Capital Markets *ReCapNet* Conference (ZEW Mannheim), the 2020 Winter Meeting of the *Econometric Society*, the Virtual Meeting of the *Urban Economics Association*, the 2020 Community Banking in the 21st Century Research and Policy Conference *(FRB of St. Louis, FDIC and the Conference of State Bank Supervisors*, the Ohio State Ph.D. Real Estate Conference (Cancelled) and NABE Economic Policy Conference (Poster Session).

2019: The 2019 SEA Presidential Session, Georgia Institute of Technology (Econ Dept.), SunTrust Bank Seminar, Georgia State University (Finance Dept.), Georgia State University (Econ Dept.), the Western Economic Association, the Boulder Summer Conference on Consumer Financial Decision Making (Poster Session) and the Midwest Economic Association.

2018: Southern Economic Association and the IMF Middle East and Central Asia Discussion Forum.

Discussions: ***Endogenous Risk-Exposure and Systemic Instability*** (by Chong Shu), Third Annual Dauphine Finance PhD Workshop, Université Paris-Dauphine (June 2020).

The Revolving Door and Insurance Solvency Regulation (by Ana-Maria Tenekedjieva), Eastern Finance Association, (April 2021).

References

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Policy Research

SME Financial Inclusion for Sustained Growth in the Middle East and Central Asia. with Ghassibe, M. and Maximiliano Appendino; International Monetary Fund Working Paper No. 19/209, September 2019.

This paper offers empirical evidence that greater financial inclusion of small and medium enterprises (SMEs) can promote higher economic growth and employment, especially in the Middle East and

Central Asia regions. First, we show that countries with higher SME financial inclusion exhibit more effective monetary policy transmission and tax collection. Second, we find substantial employment and labor productivity growth gains at the firm level from access to credit, gains that are higher for SMEs. We also obtain evidence of a substantial positive impact on SME employment and labor productivity growth from improved credit bureau coverage and insolvency regimes. Finally, cross-country aggregate evidence confirms the employment and growth gains from SME financial inclusion, which appear larger in the Middle East and Central Asia than in other regions.

Referee Experience

Economic Notes

Policy Experience

PhD Intern (Fund Internship Program), International Monetary Fund, Middle East and Central Asia Department (MCD), Washington D.C. Supervisor: Anta Ndoye. *Summer 2018*

Diplomat and Economic Affairs Officer, Embassy of Egypt in Paris. *9/2011-8/2015*

Diplomat and Economic Affairs Officer, Department of International Economic Relations, Egypt's Ministry of Foreign Affairs, Cairo, Egypt. *8/2008-8/2011*

Diplomat, Special assignment with Egypt's delegation to the United Nations to participate in the meetings of the Economic and Financial Committee of the United Nations General Assembly, New York. *10/2008 & 11/2010*

Teaching Experience

Teaching Assistant for Dr. Faraz Farhidi: Applied Econometrics (Georgia State). *Spring 2020*

Teaching Assistant for Dr. Robert Moore: The Global Economy (Georgia State) *Fall 2016*

Teaching Assistant for Dr. Jon Mansfield: Principles of Macroeconomics (Georgia State) *Fall 2015*

Language Skills

Full proficiency in English, French and Arabic.

Late-career Unemployment Shocks, Pension Outcomes and Unemployment Insurance

Samir E. Mahmoudi *†‡

This Version: November, 2021.

Abstract

In response to unemployment shocks, older workers deplete their 401(k)s, particularly after the waiving of the early withdrawal penalty on unemployment-motivated withdrawals at age 55. This paper shows that unemployment insurance keeps older workers from depleting their 401(k) assets following job losses. Unemployment insurance also incentivizes older unemployed workers to delay claiming their Social Security benefits beyond the earliest age of eligibility, 62. Overall, unemployment insurance enhances the retirement income of the individuals having a history of late-career layoffs by helping them preserve their 401(k) assets, the return on these assets and opt for a higher stream of Social Security benefits.

JEL classification: G51, H24, H55, J14, J32 and J65.

Keywords: Retirement Savings, Private Pensions, Social Security and Unemployment Insurance.

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†I acknowledge the influential support of the Alfred P. Sloan Foundation, through the National Bureau of Economic Research (NBER) Pre-Doctoral Fellowship on the Economics of an Aging Workforce. I thank the NBER staff, particularly Elisa Pepe, for the administrative support and flexibility.

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1 Introduction

What is the effect of late-career unemployment shocks on retirement income? Late career job losses leave workers vulnerable to a lower likelihood of re-employment [Chan and Huff Stevens 2001; Hirsch et al. 2000], longer unemployment durations [GAO 2012], a post-displacement wage penalty [Shapiro and Sandell 1985], age discrimination [Neumark et al. 2019] and deteriorated health [Coile et al. 2014]. Their reduced job opportunities and short remaining career time make it less likely for older workers to replenish their retirement savings after a job loss-induced depletion. Unemployment shocks could also motivate early Social Security claiming leaving individuals with a lower stream of benefits throughout retirement [Card et al. 2014]. What role can Unemployment Insurance play to alleviate these constraints? Addressing these questions helps explain the factors driving retirement income security of nearly a million unemployed workers aged 55-64 in the United States.[1]

I show that following a job loss, older workers initiate a fast depletion of their defined-contribution 401(k) wealth, followed by a similar depletion of their Individual Retirement Accounts (IRAs), well before the Full Retirement Age.[2] This early depletion of private pensions makes Social Security wealth their main remaining asset dedicated to retirement. This pension decumulation by job losers is intensified by the removal of the Early Withdrawal Penalty on 401(k)s, age 55 for job losers, and on IRAs, age $59\frac{1}{2}$. Hence, these asset decumulation decisions are highly responsive to the tax-price of withdrawals from Tax-Deferred Accounts.

This paper shows that Unemployment Insurance (UI) keeps older workers from depleting their 401(k) pension assets following job losses. Unemployment insurance has a similar effect on older unemployed workers' Social Security take-up timing decisions. Following a job loss, Social Security-eligible individuals with access to more generous unemployment insurance are more likely to delay Social Security benefits claiming beyond the earliest age of eligibility, 62. Unemployment insurance significantly enhances retirement income for the workers with late-career layoffs in two ways. First,

[1] Data from the Bureau of Labor Statistics at https://www.bls.gov/web/empsit/cpseea36.htm and GAO (2012).

[2] The Full Retirement Age, the age of workers' eligibility for the Social Security Primary Insurance Amount, is 65 for the time frame studied in this paper.

reducing unemployment-motivated 401(k) asset leakage helps older workers preserve the returns on their retirement investments. Second, incentivizing older job losers to delay Social Security claiming results in a higher expected present value of their stream of benefits. Overall, unemployment insurance, a policy aimed at easing short-term liquidity constraints, helps older workers improve their long-term private pensions and Social Security outcomes throughout retirement.

Using two panels of data from the Survey of Income and Program Participation (SIPP), covering the periods 1996-1999 and 2001-2003, I link workers' labor market histories to their 401(k) pension outcomes and their Social Security benefit receipt histories. I exploit a tax code exception that waives the early withdrawal penalty on 401(k) withdrawals following a job separation during or after the year the employee reaches age 55. This exception creates a discontinuity in the tax price of unemployment-induced withdrawals around that age but does not affect the tax-price of 401(k) withdrawals for the employed. I document significant asset flows out of 401(k) plans in response to job losses occurring after age 55. Holding workers' own asset growth rate constant, I find that a job loss just after age 55 results in a 51 percent larger decline in 401(k) pension savings, compared to a job loss just before 55, equivalent to an average 401(k) withdrawal of $5,900 upon job loss. The absence of contemporaneous inflows into IRAs suggests that these funds leaked out of the tax-deferred system to cover unemployment-related expenses. The parallel trends of 401(k) savings between job losers and employed workers younger than 55 support a causal interpretation of this finding. Similarly, in response to the complete removal of the early withdrawal penalty on IRA withdrawals at age $59\frac{1}{2}$, I report large job loss-induced depletion of IRA wealth of the unemployed immediately after that age. By the age of eligibility for early Social Security benefits, 62, workers with a history of late-career unemployment shocks had already significantly depleted their private pensions, making social security their main source of income dedicated to retirement.

I then estimate the effect of UI generosity on 401(k) pension decumulation of older job losers by comparing 401(k) saving rates among the unemployed and the employed, in response to state-level changes in UI benefits generosity, holding other state-time factors constant. I show that a $1,000 increase in states' regular maximum unemployment benefits, during the course of an unemployment

spell, reduces the negative effect of a job loss on 401(k) savings by enabling older unemployed workers to preserve an average of about $750 of 401(k) assets from depletion during unemployment. These effects are stronger among the most liquidity constrained workers, those with few financial assets outside of retirement accounts. I conduct a similar analysis of unemployment benefit generosity on social security claiming behavior following a job loss. I compare the likelihood of Social Security benefits claiming between older workers subjected to job loss shocks at different ages and residing in states with different levels of unemployment benefits generosity. Late-career job losses lead to immediate Social Security claiming once individuals become eligible for Social Security, at age 62, consistent with Coile and Levine (2007, 2011) and Card et al. (2014). Yet, I show that among the Social Security-eligible job losers, those with access to more generous unemployment benefits are more likely to delay Social Security benefits claiming beyond the earliest age of eligibility 62.

These findings make three main contributions. First, while many studies document the consumption smoothing effects of unemployment insurance [Browning and Crossley 2009; East and Kuka 2015; Gruber 1997], to the best of my knowledge, this paper is the first to uncover a novel effect of unemployment benefits on retirement income security. Unemployment insurance enhances retirement income for the individuals with late-career job losses by helping them preserve their 401(k) savings from depletion during unemployment and by incentivizing them to delay their social security take-up decision beyond age 62. By documenting this interaction between unemployment insurance and Social Security, this study also contributes to a literature on the factors influencing Social Security claiming patterns [Coile and Levine 2007, 2011; French 2005].

Second, previous research on 401(k) pre-retirement withdrawals documented their substantial magnitude and their association with the liquidity constraints arising from income shocks [Amromin et al. 2003; Argento et al. 2015]. Relative to these studies, I document the effect of the Early Withdrawal Penalty on the pre-retirement withdrawals of the unemployed. The flexibility to make early withdrawals is a double-edged sword. While it allows workers to smooth their consumption during unemployment, the significant size of the flows out of the tax-deferred pension system reduces retirement income. This trade-off motivated a policy debate on the optimal liquidity of pension

accounts and the effects of early withdrawal penalties [Beshears et al. 2015; Poterba et al. 2001]. The enactment of the 2020 Coronavirus Aid, Relief, and Economic Security Act (CARES) made this trade-off of particular policy interest. CARES waived the early withdrawal penalty on coronavirus-related pension distributions, including those made to alleviate financial hardships resulting from COVID-related unemployment. While this waiver reduces the cost of funds for the unemployed, it becomes particularly important to assess the cost of this policy in terms of forgone future retirement income. To contribute to this debate, I exploit a sharp discontinuity in the tax-price of accessing 401(k)s by job losers around age 55 based on the timing of the job loss to estimate the responsiveness of 401(k) flows to the removal of the early withdrawal penalty. Inferring job losers' responsiveness to the EWP is crucially needed to understand the effects of the usage of the early withdrawal penalty as a policy lever to alleviate financial hardships during downturns. Relatedly, this study contributes to a broader literature on workers' adjustments to income shocks [Guvenen 2007; Krueger and Perri 2011; Mu 2006]. Consistent with the theoretical contributions of Love (2006) and Stiglitz and Yun (2005), I show that 401(k)s are consistently used to self-insure against unemployment shocks.

Third, the lack of longitudinal data linking workers' labor market histories to the evolution of their pension wealth constrained research on the effect of labor market shocks on defined contribution pensions [Mitchell and Turner 2010]. This limited prior research on early pension withdrawals to tax return data with little information on contemporaneous labor market outcomes. I overcome this challenge using SIPP that allows me to construct detailed labor market histories of workers and link them to their 401(k)s, as well as their Social Security benefit receipt over time.

2 Policy background

2.1 Tax-deferred pension accounts: 401(k) and IRA plans

To reduce the incentives for pre-retirement 401(k) withdrawals, a 10% Early Withdrawal Penalty is imposed in addition to applicable income taxes on 401(k) distributions made prior to age $59\frac{1}{2}$. A similar penalty applies to IRAs. Some hardship-related exceptions provide workers with penalty-free

access to their 401(k)s to facilitate the use of pension savings in response to transitory shocks prior to that age. This includes withdrawals made after a job separation during or after the year the employee reaches age 55.[3] This exception does not apply for IRAs.

Following job separations, workers can preserve the tax-deferred status of the savings they accumulated in their former employers' 401(k) plans by keeping their funds with their old employers' plans or transfer them to their new employers' plans or transfer them into an IRA (an IRA *rollover*). Alternatively, they can cashout their pension savings to finance their consumption during unemployment or to make non-tax-deferred investments. The second option is considered to be a leakage of funds outside of the pension system, corresponding to the usage of pension savings for non-retirement purposes. Unless they qualify for an exception, early distributions are penalized by 10%.

The U.S. defined contribution system provides significant flexibility to respond to transitory shocks, by allowing less costly pre-retirement withdrawals compared to other developed countries [Beshears et al. 2015]. This flexibility allows significant pre-retirement leakage of pension savings out of the tax-deferred system. Early withdrawals are sizeable and prevalent among who are less likely to *rollover* their funds into tax-qualified accounts following a job separation [Argento et al. 2015; Chang 1996]. This sizeable leakage is a policy concern, with Argento et al. (2015) estimating a leakage of 40 cents for each dollar of pension contributions made prior to age 55.

2.2 Unemployment Insurance

Unemployment insurance is a joint federal-state program that provides cash benefits to unemployed workers who lose their jobs through no fault of their own provided that they are able and available to work and are actively seeking re-employment. The insurance provided by the program is temporary with a typical maximum duration of 26 weeks during the period of this study. The heterogeneity in state UI benefit generosity stems from the fact that states independently set their own UI benefit formulae.[4] States set their own benefit schedules that provide unemployed workers with

[3] Internal Revenue Code Section 72(t)(2)(A)(v). Other exceptions include, but are not limited to, distributions made because of total and permanent disability or substantial un-reimbursed medical expenses.

[4] Additionally, exceptional federal programs might kick in to provide supplemental funding to the states during downturns. These exceptional programs include the Extended Benefits Program and the Emergency

replacement income typically of 50%, but capped to a maximum benefit amount and a maximum duration, typically 26 weeks.

Similar to Agrawal and Matsa (2013) and Hsu et al. (2018), I measure regular state UI benefit generosity using the parameters defining the maximum generosity of state UI schedules; specifically the upper bound of weekly benefits and the maximum duration of eligibility in weeks.[5] I use the product of these two parameters, $Max\,Benefit_{st}$, as a measure of the maximum amount of benefits made available by states' UI regular benefits programs in each year over the period of the SIPP panels used 1996-1999 and 2001-2003. This product reflects the maximum amount of UI benefits a claimant could receive during the course of an unemployment spell. There is limited variation between states and over time in the duration of benefit eligibility (26 weeks on average). However, there is a wide range of variation in the maximum weekly level of income support states make available to the unemployed varying from a minimum of \$175 weekly benefits in Missouri in 1996 and 1997, to a maximum of \$768 in Massachusetts in 2002. Table 2 provides summary statistics on $Max\,Benefit_{st}$ for the 46 states covered by the analyses in this paper.[6] UI is expressed in \$1,000 corresponding to 0.38 standard deviation in the maximum amount of benefits available during the course of an unemployment spell in the 46 states and the period of study 1996-1999 and 2001-2003. A variation of \$1,000 in benefits is also slightly less than half the average state-level change in unemployment benefits over the period of the study. The generosity of these benefits also changed considerably over time, with an average increase of 31% or \$2210 in 2003 relative to 1996. In the Appendix, I show that $Max\,Benefit_{st}$ is predictive of state unemployment compensation payments with an elasticity in the range of one.

[Table 2 about here]

Unemployment Compensation Program. However, all analyses in this paper focus on states' regular unemployment benefits programs.

[5]These UI generosity parameters are provided by the U.S. Department of Labor webpage on the *'Significant Provisions of State UI Laws'* and are collected and made available by Hsu et al. (2018).

[6]To ensure respondents' confidentiality, SIPP data provides state location information only for respondents residing in 45 states and the District of Columbia. Omitted states are Maine, Vermont, North Dakota, South Dakota and Wyoming.

2.3 Social Security

Social Security (SS) retirement benefits can be claimed starting at age 62, but actuarial adjustments are made based on the age of benefits initiation. Claiming at the full retirement age, 65 for the time frame of this study, guarantees a 100% of one's Primary Insurance Amount (PIA) determined based on the worker's lifetime earnings. Claiming prior to the FRA reduces benefits by $\frac{5}{9}\%$ of the PIA for each month of difference between the FRA and the age of SS benefits initiation. During the time frame of the paper, the penalty for claiming at 62 is 20% of the PIA.[7] Similarly, delaying benefits claiming by one month, from 62 to 62 and a month, is equivalent to purchasing a one month deferred annuity providing a lifelong benefit of $\frac{5}{9}\%$ of the PIA in exchange for a one time premium of 80% of the PIA. A large literature emphasizes the actuarial advantages of delaying benefits initiation [Coile et al. 2002; Munnel and Soto 2005; Shoven and Slavov 2014]. However, 62 is the popular age for benefits initiation with about 40% of all workers claiming at 62 [Munnell and Chen 2015].

3 Conceptual framework

Older workers face a trade-off between unemployment risk and longevity risk; the risk of running out of funds at old ages. Pre-retirement pension withdrawals reduce the financial resources available for retirement funding. Following a late-career job loss, workers have four potential options to tap: their defined-contribution 401(k) plans, their IRAs, their Social Security Wealth and their liquid wealth held outside of retirement accounts. To make these decisions, older unemployed workers choose the amount of their pre-retirement pension distribution D_t that maximizes the discounted sum of their utilities prior and after retirement:

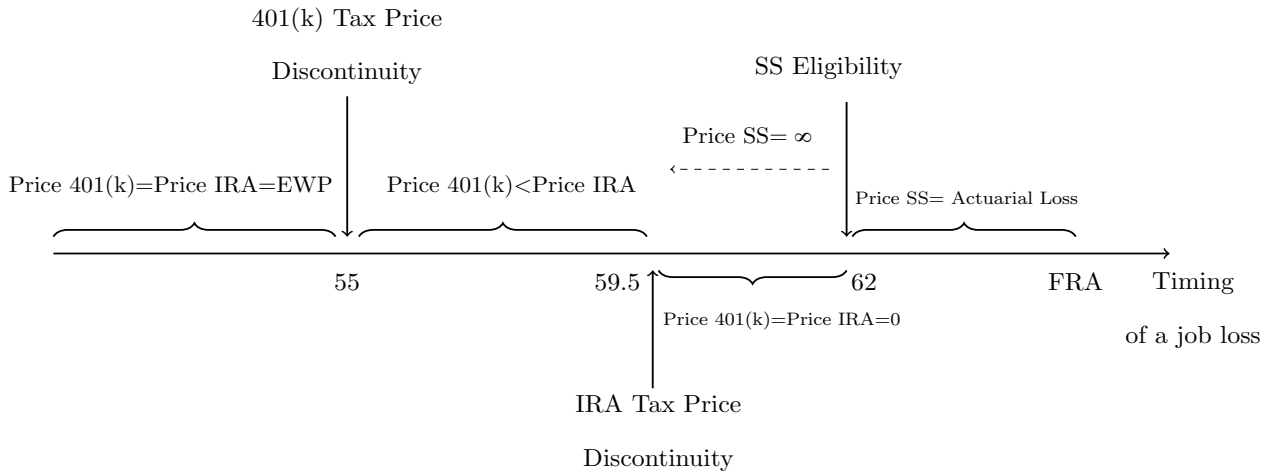
$$V(D_t) = \max_{D_t} \overbrace{u(I_t + D_t(1 - EWP(Age_t)) + UI_t)}^{During\ Unemployment} + \beta \overbrace{u(I_{t+1} + (P - D_t)(1 + r_t))}^{Post\ Retirement} \quad (1)$$

The utility of consumption in the pre-retirement period is a function of income I_t, in addition

[7] The 1983 reform increased the penalty of early claiming by increasing the full retirement age. However, cohorts impacted by this reform reached their new full retirement age starting 2004 which is beyond the time frame of this study.

to a pre-retirement pension distribution D_t subject to an age-dependent early withdrawal penalty EWP, as well as unemployment benefits UI_t. After retirement, the early distribution translates to a loss of investment returns on the amount of the distribution $r_t D_t$ where r_t is the rate of return on pension assets. The remaining pension income available to the worker is given by $(P - D_t)(1 + r_t)$. I_{t+1} denotes other sources of post-retirement income.

A job loss interrupts workers' incomes (reduces I_t) and increases the marginal value of pre-retirement pension distributions. The removal of the EWP reduces the tax price of a distribution and increases its utility value. The tax price of accessing each of these pensions is age-dependent and is key in determining the order at which older workers make use of these funds in response to job losses. Three tax price discontinuities influence the drawdown of retirement wealth following a late-career job loss. First, age 55 defines a discontinuity in the tax price of 401(k) funds. A job loss after 55 allows penalty-free access to 401(k)s. Second, age $59\frac{1}{2}$ defines a discontinuity in the tax price of IRAs. After $59\frac{1}{2}$, tapping IRAs becomes relatively cheaper than before $59\frac{1}{2}$. Third, reaching age 62 triggers eligibility for early, but actuarially reduced, Social Security benefits. Accordingly, Social Security wealth could be seen as a pension account with an infinity tax price of accessing prior to age 62. At age 62, the tax price of claiming becomes equal to the actuarial reduction of the benefits amount relative to claiming at the FRA, 65. Therefore, the timing of the job loss implies the relative tax prices of tapping each of the three available pension accounts.



Age-dependent tax prices of tapping available pension accounts: This diagram illustrates the relative

tax prices of tapping different pension accounts. Prior to age 55, withdrawals from both 401(k)s and IRAs are subjected to a 10% EWP. Within the age range 55-59$\frac{1}{2}$, job loss-motivated access to 401(k)s is penalty-free but IRAs are subject to the EWP. After 59$\frac{1}{2}$, the EWP on IRAs is removed. Reaching age 62 unlocks Social Security wealth. However, claiming prior to the FRA entails an actuarial loss.

Being a less costly substitute, unemployment benefits reduce the marginal value of pre-retirement pension distributions. The effect of unemployment insurance is higher for the most liquidity constrained workers, those who hold few assets outside of pension accounts. By enabling older workers to preserve their pension savings from depletion following a job loss, unemployment benefits boost lifetime and retirement income. The gains in retirement income are the investment returns on the assets preserved from depletion due to unemployment benefits. I provide empirical estimates of the effect of unemployment insurance on pre-retirement pension withdrawals. Knowing the prevailing average market returns, this estimate can be used to infer the loss of retirement income due to early job loss-motivated distributions. Similarly, unemployment benefits lower the marginal value of early Social Security claiming. It keeps older job losers from early Social Security benefit initiation. The return on this delay is a lifetime higher present value of benefits realized by claiming later.

4 Data

4.1 401(k)s, IRAs and other Assets

I use data on workers' asset holdings in 401(k)'s and IRAs from two consecutive panels from the Survey of Income and Program Participation (the 1996 and 2001 panels), covering the periods 1996-1999 and 2001-2003 respectively. Asset data are collected annually and made available by the topical modules accompanying waves 3, 6, 9 and 12 (where available).[8] The data replicate main features of the age profile and distribution of the Tax-Deferred Accounts' (TDAs) balances known in the literature. The effects of the EWP reflect on the age profile of 401(k) asset holdings. 401(k)'s

[8]The 1996 Panel provides Asset Data in four topical modules collected approximately at the end of 1996, 97, 98 and 99. The 2001 panel provides three asset modules collected approximately at the end of 2001, 2002 and 2003.

population average balances start declining significantly exactly after the $59\frac{1}{2}$ age cutoff [Figure 1 (A)], corresponding to the removal of the EWP. Figure 1 (B) shows a sharp decline in 401(k) balances' average growth rate immediately at this age cutoff, consistent with the removal of the EWP triggering significant withdrawals immediately after age $59\frac{1}{2}$. The age profile for IRA asset holdings is also consistent with prior studies [Mortenson et al. 2019; Brown et al. 2017; Love 2007].

[Figures 1(A) and 1(B) about here]

In Appendix Table A1, I show that the TDAs' asset distribution is skewed, consistent with the literature on inequality and the distribution of wealth [Benhabib and Bisin 2018] and the distribution of TDA wealth in particular [Gelber 2011]. The sample contains 287,623 individual-year observations corresponding to 104,031 working-age individuals (22-65 years old). Only 28.2% of these individuals report owning 401(k) accounts, consistent with low participation rates in employer-sponsored plans documented by Butrica and Smith (2012).[9] Similarly, 19.4% report owning an IRA. The median values for asset holdings in 401(k)s and IRAs are zeros while the average market values are $7828.2 and $4890.5 ($2000 dollars) for 401(k) and IRA accounts respectively. TDAs asset holdings grow steadily as workers age. For the near-retirement population aged 50-59, the median values of 401(k) and IRA accounts are also zeros while the unconditional averages are $13,393.8 and $9,526.8 ($2000 dollars) respectively. SIPP also provides data on assets held in checking and savings accounts, in addition to ownership of bonds and stocks. The data is reported by SIPP in terms of data held in own name and those held jointly with spouse. The distribution of wealth held in other non-tax-deferred accounts is also skewed with all median values of account balances being zero. The average value of total liquid assets held independently and jointly with spouse is $36,491 while the median value is $1300 and 25% of the near-retirement population report having less than a dollar of wealth held outside of retirement accounts. On the other hand, the average home equity is $82,637.9.

[Table 1 about here]

[9]Participation rates in employer-sponsored dc plans increased over time reaching about 41% in 2010 [Butrica and Smith 2012].

4.2 Labor market history and demographic characteristics

SIPP allows researchers to link asset data provided by its topical modules with individuals' detailed labor market histories. The core modules collect data on individuals' weekly labor force status. Each consecutive set of three core waves of SIPP, 1-3, 4-6, 7-9 and 10-12 (where available) cover approximately a calendar year. I compute the total duration of all unemployment spells experienced by each individual within each of these sets, corresponding approximately to each calendar year. Asset data are collected also approximately at the end of the calendar year. Accordingly, the joint employment-asset dataset I construct includes labor market information throughout the year linked with asset data collected at the end of the year.[10] To measure the periods of unemployment, I consider the weeks at which workers report being on layoff or absent without pay or without a job and looking for work.[11] For each worker in each year, I compute the number of weeks of unemployment. I then define two indicator variables: 1) being on layoff, $Layoff_{it}$, that equals one if worker i had some weeks of unemployment during year t and zero otherwise, and 2) similar to Chetty (2008), I define the timing of a job loss, $Job\,Loss_{it}$, to be the timing of the transition from an employment to an unemployment state. Accordingly, $Job\,Loss_{it}$ equals one if worker i experienced some weeks of unemployment at year t and no weeks of layoff at year t-1 and was not out of the labor force.[12] Accordingly, $Job\,Loss_{it}$ indicates the exact timing (Age-Year) of a job loss. For the population aged 50-59 years old, I identify 1,476 events of job loss for a population size of 22,975 individuals. Workers are observed for four consecutive years in SIPP panel 1996 or for three consecutive years in SIPP panel 2001. In Appendix A, I show that the demographic characteristics of the near-retirement sample approximately match U.S. population averages for similar age categories in the 2000 Census.

[10] See Appendix A for a detailed description of the construction of the dataset.

[11] I use the SIPP variables RWKESR1, RWKESR2, RWKESR3, RWKESR4 and RWKESR5 that report worker's labor force status for each week within each month of the panel. I consider a week to be a week of layoff if the worker responded by either *With job/bus - on layoff, absent w/out pay* or *No job/bus - looking for work or on layoff*.

[12] I consider an individual to be not in the labor force if he /she reports being unemployed but not looking for a job during all weeks of the year.

4.3 Social Security benefits receipt

To identify the timing of workers' Social Security benefits initiation, I use the sequence of monthly Social Security income reported in SIPP. I define a Social Security benefits initiation event as the transition from no Social Security benefits to some positive monthly Social Security income reported. I then truncate the exact age of claiming to the smallest integer value. Using this approach, I am able to replicate approximately the same pattern of Social Security benefit age claiming documented using administrative datasets [Appendix Figure A.1]. I identify 3,036 events of Social Security benefits initiation for individuals in the 62-70 age range, with the largest spike in claiming by workers between their 62^{nd} and 63^{rd} birthday (about 44%), a smaller spike at the full retirement age, 65 (about 15%) for these cohorts and few individuals waiting beyond 65.[13]

5 Late-career job loss and pension asset decumulation

5.1 Late-career job loss and 401(k) pension decumulation

I empirically estimate of the effect of a job loss, around age 55, on 401(k) withdrawals. The cost of accessing 401(k)s following a job loss depends on the age at which workers separate from service. By waiving the EWP at age 55, the tax code creates a sharp discontinuity in the cost of accessing these funds for unemployed workers, whereas the EWP remains effective for non-job losers.[14] Accordingly, job losers' incentives to tap their 401(k)s vary sharply depending on the age at which they lost their jobs, pre vs. post age 55. For the near-retirement population, age 50-59, I identify 1,476 job loss events. Among these, 323 job loss events correspond to individuals owning 401(k) accounts.[15] The 401(k) ownership rate among the whole population age 50-59 is 30.5%. Job separation rates for this near-retirement sample of individuals reflect the U.S. population average unemployment for similar

[13] I provide a detailed description of the construction of the Social Security benefit initiation data using SIPP in Appendix A.

[14] The EWP is then completely removed for all groups at age $59\frac{1}{2}$.

[15] The low number of survey respondents who experienced job loss and held a 401(k) could be considered as a limitation of this study. However, the results on the 401(k) withdrawals appear consistent with the theoretical predictions despite the sample size.

age categories during the period 1996-2003.[16]

To document the average effect of the penalty removal, I use the following specification to measure the effect of job loss on 401(k) asset withdrawals after age 55 (in a penalty-free setting), relative to before age 55 (in a penalized withdrawals setting) for the population aged 50-59 years old:

$$\begin{aligned} ln(A_{it}+10) - ln(A_{it-1}+10) = \eta_i + \beta_1\, Job\, Loss_{it} + \beta_2\, 1[Age_{it} > 55] \\ + \beta_3\, 1[Age_{it} > 55] \times Job\, Loss_{it} + \zeta_{st} + \mathrm{X}_{it}\Gamma + \epsilon_{it} \end{aligned} \tag{2}$$

The dependent variable, $Y_{it} = ln(A_{it}+10) - ln(A_{it-1}+10)$, is the annual 401(k) asset withdrawal of worker i of age Age_{it} at year t relative to the worker's lagged asset holdings (401(k) asset growth rate), holding the average growth rate ($\overline{ln(A_{it}+10) - ln(A_{it-1}+10)}$) for each worker constant, by accounting for person fixed-effects η_i.[17] ζ_{st} denotes state-year fixed effects and controls for state-wide policies and shocks; X_{it} is a vector of person-specific time-varying controls accounting for lagged versions of annual earnings, financial assets and liabilities owed independently and jointly with spouse. ϵ_{it} is an idiosyncratic error term.[18] Accordingly, β_1 quantifies the average association between job loss and the growth rate of 401(k) savings and β_2 captures the average difference between workers older and younger than 55. The coefficient of interest β_3 quantifies the average effect of a job loss after age 55 compared to a job loss before 55 on the growth rate of 401(k) pension savings, holding worker's own rate of 401(k) asset growth constant.

The coefficient' estimate $\hat{\beta}_3$ presented in table 3 (column (1)) shows that job loss just after age 55 results in a 51 percent larger decline in 401(k) pension savings compared to a job loss just before 55, corresponding to a job loss-motivated withdrawal of approximately \$5,900 (in 2000's dollars) of pension assets.[19] Similar to Gelber (2011), to test for functional form dependence, I use the

[16] I provide an overview of the sample size, by age and employment status of all workers in Appendix Table D.1. The quarterly unemployment rate for the population aged 55-64 years old during 1996-2003 is around 3-3.5% as provided by the BLS at https://data.bls.gov/PDQWeb/ln. and approximately similar to the rates implied by the separations documented in Table D.1.

[17] Similar to Gelber (2011), 401(k) assets are incremented by \$10. Accordingly, the natural logarithm is defined for all asset observations including workers having zero assets.

[18] X_{it} includes annual earnings, checking and saving accounts' balances, bonds and stock holdings, credit card debt and store bills owed (independently and jointly with spouse) and mortgage or rent payments. These control variables account for households' balance sheets and reflect their ability to weather shocks.

[19] This effect can be reported as an elasticity of 5.1. A one percentage point decline in the early withdrawal

Inverse Hyperbolic Sine (IHS) transformation suggested by Burbidge et al. (1988). The IHS reduces the influence of extreme values of wealth and is defined for zero values and thus, can handle the excess observations of zero wealth.[20] I estimate specification 2 with the dependent variable being $[Sinh^{-1}(A_{it}) - Sinh^{-1}(A_{i(t-1)})]$ and report, in table 3 (column (2)), an estimate of β_3 in the same range estimated earlier.

[Table 3 about here]

These estimates suggest that the depletion of 401(k)s upon job loss is highly sensitive to the tax price of accessing retirement accounts. A job loss is 51% more damaging to 401(k) wealth in a penalty-free setting (post-55) compared to a setting where withdrawals are penalized by a 10% tax.[21] The policy relevance of this finding emanates from the current usage of the EWP as a policy lever to alleviate financial hardships. For instance, in light of the current downturn, the CARES act waived the EWP for coronavirus-related distributions with a view to reduce the cost of resorting to 401(k) savings during unemployment. While it can alleviate unemployment-related hardships, the removal of the EWP can lead to a depletion of retirement savings with significant consequences for retirement income adequacy, especially for workers with late-career unemployment shocks.

These results serve as guidance for policymakers considering waiving the early withdrawal penalty as a policy lever in response to future downturns.[22] The US pension system allows for inexpensive access to pension savings compared to other developed economies [Beshears et al. 2015]. This preference for liquidity imposes a trade-off between the consumption smoothing benefits of using pension assets in response to pre-retirement job losses and the depletion of retirement savings resulting from that flexibility. The estimates provided in table 3 documents the loss of future retirement income of older job losers in response to the removal of the EWP.

To document the exact age profile of the effect of this tax-price discontinuity on job losers' 401(k)

penalty increases job losers' 401(k) asset withdrawal by 5.1%. However, the U.S. pension system only provides a 10% variation in the Early Withdrawal Penalty. Extending the reported effect to other values of the penalty would rely on an out-of-sample prediction.

[20]The IHS is defined as $Sinh^{-1}(A_i) = \ln(A_i + \sqrt{1 + A_i^2})$.

[21]In Appendix B, I test and find no evidence on a potential manipulation of the timing of job loss. I find no evidence on a discontinuity in the likelihood of observing a job separation at the cutoff age, 55.

[22]Some countries adopt an income-contingent pre-retirement withdrawal penalty [Beshears et al. 2015].

withdrawals, I estimate the following event-study specification to compare job losers' average 401(k) asset growth rates to non-job losers' 401(k) asset growth, net of person fixed-effects at each age among the near-retirement population:

$$ln(A_{it}+10) - ln(A_{it-1}+10) = \eta_i + \sum_{Age \neq 54} 1[A = Age] \times Job\,Loss_{it} \times \theta_{Age} + \lambda_{Age} + \zeta_{st} + \mathrm{X}_{it}\Gamma + \epsilon_{it} \tag{3}$$

$1[A = Age]$ is an indicator function that equals one at the corresponding age and zero otherwise. By accounting for age fixed-effects λ_{Age}, each coefficient, θ_{Age}, quantifies the average difference in 401(k) asset growth rates between the workers experiencing a $Job\,Loss_{it}$ and non-job losers at each age holding worker's own rate of 401(k) asset growth constant, relative to the difference at the omitted age category 54. ϵ_{it} is an idiosyncratic error term. Accordingly, the pattern on the set of coefficient estimates $\hat{\theta}_{Age}$, illustrated in figure 2, documents the age profile of this difference in 401(k) withdrawal behavior between job losers and non-job losers holding worker's own rate of 401(k) asset growth constant.

[Figure 2 (A) about here]

While accessing 401(k)s becomes less costly following a job loss after age 55 compared to following a job loss prior to age 55, the tax price is constant for the employed. Consistently, figure 2 (A) shows a divergence of savings' trends between job losers and non-job losers starting exactly after age 55. Figure 2 documents a precipitous decumulation of 401(k) assets for individuals who experienced a job loss after age 55 relative to those who did not experience a job loss, holding workers' own personal saving rates constant. On the other hand, prior to the removal of the penalty at age 55, the set of estimates $\hat{\theta}_{Age}$ document insignificant and constant differences in 401(k) asset growth rates by job losers relative to non-job losers, net off fixed-effects. This post-age 55 decumulation of 401(k) assets and the identical pre-age 55 trends suggest a causal effect of the change in the tax price of accessing 401(k)s on job losers asset withdrawal behavior.

5.2 Late-career Job Loss and IRA Funds

Conducting a similar analysis for assets held in IRA accounts serves three purposes. First, were these 401(k) withdrawals *rolled over* into IRAs?[23] If yes, the observed decumulation of 401(k) assets after age 55 would reflect a movement of funds between different pension accounts, rather than a job loss-induced leakage of 401(k) assets towards non-retirement purposes. To address this possibility, I re-estimate specification 2 using the growth rates of IRA assets as a dependent variable. The economically and statistically insignificant estimate of β_3 provided in table 3 [Column (3)] indicates that IRA assets do not react differently in response to a job loss after 55 compared to one prior to 55. Similarly, I estimate the same event-study specified in equation 3 and show that the age profile of IRA asset growth rate appears not to show any discontinuity at age 55 relative to non-job losers [Figure 2 (B)]. Hence, the decumulation of 401(k) assets following a post-55 job loss is not accompanied with an increase in IRA assets consistent with a leakage of retirement funds out of the tax-deferred pension system rather than 401(k) assets being transferred to IRAs. Second, since IRAs are not eligible for a similar suspension of the EWP in the event of a separation from service after age 55, the tax price of accessing IRA funds for job losers remains constant around that age. Consistently, the economically and statistically insignificant response of IRA funds serves as a placebo test supporting the results on 401(k) outflows. Third, at age $59\frac{1}{2}$, there is a similar discontinuity in the tax price of accessing IRAs. The early withdrawal penalty on IRA withdrawals is removed regardless of employment status at that age. In Appendix E, I provide evidence on a similar excess decumulation of IRA assets by job losers immediately following the removal of the EWP at age 59.5. A job loss immediately after $59\frac{1}{2}$ triggers larger decumulation of IRA funds compared to a job loss prior to $59\frac{1}{2}$. This result provides additional evidence on the effect of the removal of the EWP on job loss-motivated withdrawal of tax-deferred pension assets.[24]

[23] The term *rollover* describes the transfer of funds between 401(k) and IRA accounts. *Rollovers* preserve the tax-deferred status of the funds as opposed to a leakage of funds out of the tax-deferred pension system.

[24] At age $59\frac{1}{2}$, the EWP on IRAs is removed regardless of employment status. In Appendix E, I show that job losers withdraw more IRA funds relative to non-job losers in response to the removal of the penalty.

6 UI as a Substitute for Private Pension Withdrawals

What role UI can play to mitigate the effects of late-career unemployment shocks on private pension decumulation? By alleviating the liquidity constraints resulting from job losses, unemployment benefits reduce the marginal value of unemployment-motivated 401(k) pension withdrawals relative to the value of keeping these funds within the tax-deferred pension system (including the investment returns and tax benefits). Accordingly, I test the hypothesis that the more generous state unemployment benefits, the less the 401(k) pension withdrawals made by older unemployed workers. To test this hypothesis, I estimate the following specification for the near-retirement population age 50-59:

$$Y_{ist} = \beta_1 \, On \; Layoff_{it} + \beta_2 \, On \; Layoff_{it} \times Max \, Benefit_{st} + \eta_i + \zeta_{st} + X_{it}\Gamma + \epsilon_{ist} \tag{4}$$

Similar to specification 2, the dependent variable is the annual growth rate of 401(k) assets for worker i residing at state s at year t, holding the average asset growth rate for each individual constant by accounting for person fixed-effects η_i. $Layoff_{it}$ is an indicator function that equals one if individual i had some weeks of layoff at year t and zero otherwise. $Layoff_{it}$ is interacted with $Max \, Benefit_{st}$, the maximum dollar amount of unemployment benefits provided by state s at year t during the course of an unemployment spell (in \$1,000s), computed as the product of the maximum weekly benefits and the duration of benefits eligibility in weeks. $Max \, Benefit_{st}$ is demeaned relative to the average of the 46 states included in this analysis presented in table 2. ζ_{st} denotes state-year fixed effects and controls for state-wide policies and shocks; X_{it} is a vector of person-specific time-varying controls accounting for lagged versions of earnings, financial assets and liabilities owed independently and jointly with spouse. ϵ_{ist} is an idiosyncratic error term.

β_1 is the average association between being unemployed and 401(k) savings rate. Conditional on being unemployed, the coefficient of interest β_2 quantifies the effect of unemployment insurance generosity on 401(k) asset growth rate, holding other state-wide factors constant. Table 4 (column (1)) shows that unemployment is associated with 18.5% less 401(k) asset growth in the state with the average level of UI generosity. Most importantly, the coefficient estimate $\hat{\beta}_2$ shows that a \$1000 increase

in the upper bound of the total state unemployment benefits, during the course of an unemployment spell, increases 401(k) asset growth rate by 7%. This corresponds to helping older unemployed workers preserve an average of about $750 from flowing out of their 401(k)s during unemployment. In the sample at hand (46 states during 1996-1999 and 2001-2003), a one standard deviation increase in $Max\,Benefit_{st}$, corresponding to $2,610, helps older unemployed workers preserve approximately $1,950 of 401(k) assets during unemployment.

[Table 4 about here]

Multiple arguments support a causal interpretation of this finding. Controlling for state-year fixed effects absorb state-by-year variations including state-wide policies and economic shocks. Using an alternative specification that does not account for state-year fixed effects, I estimate the effect of UI generosity on the employed in table 4: (Column (2)). Accordingly, I show that $Max\,Benefit_{st}$ has an insignificant average effect except on the unemployed. While employed workers' savings can be affected by UI through a precautionary motive channel [Engen and Gruber 2001], UI is expected to primarily influence the unemployed. Consistently, the small magnitude and the insignificance of the estimate of the coefficient on $Max\,Benefit_{st}$ serves as a falsification test. It indicates that state UI benefit generosity has no meaningful association with the 401(k) savings of the employed population who are ineligible for UI.[25] As a robustness check, I use the $Job\,Loss_{it}$ indicator variable instead of $Layoff_{it}$ and obtain a coefficient in the direction and range, 0.43 equivalent to approximately $500 of 401(k) assets preserved [Table 4: Column (3)].[26]

While state-year fixed effects account for changes in state-wide factors, a remaining concern could emanate from a potential association between UI generosity and some state-level factors that differentially affect the unemployed relative to the employed. To test this hypothesis, I provide detailed sensitivity checks in Appendix F to show that I obtain approximately similar estimates of the effect of UI on 401(k) saving rates of the unemployed, β_2, after having allowed for state-level macroeconomic conditions, social policies and state-level political factors to have different effects on workers based

[25] To avoid selection issues, I remove few observations corresponding to workers who move between states.

[26] Both lead to the same effect. Using $Layoff_{it}$ captures unemployment while using $Job\,Loss_{it}$ captures the unemployed only at the timing of the job loss. Recall that $Job\,Loss_{it}$ equals one only at the year of the job loss and zero otherwise.

on their employment status. One might also worry that workers in states having more generous benefits tend to have longer unemployment duration which may, in turn, increase the propensity to withdraw from 401(k)s. I address this concern by showing that I obtain similar results after having controlled for unemployed workers' total number of weeks of unemployment during the year.

By crowding out pre-retirement 401(k) withdrawals, UI preserves 401(k) funds from depletion and increase lifetime and retirement income. This increase corresponds to the returns on the preserved assets and the tax advantages should these withdrawals be delayed. Since the geometric rate of nominal return on defined contribution plans over 1990-2012 is in the range of 5.9-7.6% depending on plan size [Munnell et al. 2015], the average financial return of preserving $750, due to a $1,000 additional maximum state UI generosity, is in the range of $44-$57 per year of delay.

6.1 Interaction with Precautionary non-tax-deferred Savings

In addition to unemployment insurance, jobless workers can draw down their non-retirement assets to smooth their consumption during unemployment. Using assets held outside of tax-deferred accounts could be a less costly option compared to 401(k) withdrawals. Resorting to non-tax-deferred assets instead of 401(k)s can help unemployed workers avoid the early withdrawal penalty and the income tax liabilities arising from 401(k) withdrawals. Workers with ample financial wealth held outside of tax-deferred accounts are less likely to resort to the more costly option of tapping their 401(k)s during unemployment. This is also consistent with Ganong et al. (2020) who report weaker consumption response to labor income shocks among high liquidity households. Accordingly, I make the hypothesis that the effect of UI on 401(k) withdrawals is likely to be smaller for workers with ample non-tax-deferred wealth.

To test this hypothesis, I allow for unemployment benefit generosity to have heterogeneous effects based on workers' liquid assets held outside of retirement accounts. I interact the amount of wealth held outside of retirement accounts immediately prior to the unemployment period with state UI benefit generosity and unemployment status. This includes total assets held in checking and saving accounts, bonds, stocks, and funds held in own name and jointly with spouse. Consistent with non-

retirement wealth being a cheaper substitute for pre-retirement 401(k) withdrawals, the negative value of the coefficient estimate on $Max\,Benefits \times On\ Layoff \times Liquid\,Assets$ indicates that UI generosity has a smaller effect on those with ample non-retirement wealth. Conversely, increases in unemployment benefits reduce 401(k) withdrawals more for the most liquidity-constrained workers; those with few assets held outside of retirement accounts. While UI crowds out the need for 401(k) withdrawals for more than 95% of the population, UI has almost zero effect on retirement savings of workers owning $100,000 of non-tax-deferred assets, consistent with UI being more influential for liquidity constrained workers [Table 4: column (4)].

7 UI as a substitute for early Social Security benefits

Next, I test the hypothesis that more generous state UI benefits incentivize older job losers to delay Social Security benefit claiming. The channel of this effect is similar to the effect of UI on pre-retirement 401(k) withdrawals. An increase in unemployment benefits reduces the marginal value of early SS income relative to the actuarial gains of delaying the claiming decision. Similar to avoiding 401(k) asset withdrawals, the decision to delay SS benefits also has a financial return. Delaying claiming increments the benefit amount by approximately 6.67% of the worker's primary insurance amount for each year of benefits delay (or $\frac{5}{9}$% per month).[27] To test this hypothesis, I compare the likelihood of early (pre-65) SS benefit initiation by older workers subjected to job loss shocks and residing in states having different levels of UI benefit generosity at different points of time. Accordingly, I estimate the effect of a job loss and of state unemployment benefit generosity on subsequent SS benefit initiation by job losers using the following specification that I estimate

[27] The penalty of early claiming increased over time. For cohorts born in 1937 or earlier, the penalty of claiming at 62 is 20% of the PIA. The penalty of claiming at 62 increased to 25% of the PIA for cohorts born between 1943-1954 and 30% for cohorts born on 1960 or later.

separately for workers of age 61, 62, 63 and 64:

$$Pr[SS\,income_{t+1} > 0 \mid SS\,income_t = 0]_{ist_{Age}} = \alpha_{A_{ge}} + \beta_{1_{Age}}\,Job\,Loss_{it} + \beta_{2_{Age}}\,Job\,Loss_{it} \times Max\,Benefit_{st} + \zeta_{st} + X_{it}\Gamma + \epsilon_{ist}; \quad Age = 61, 62, 63\ and\ 64 \tag{5}$$

The outcome of interest is a binary variable that equals one if individual i residing at state s reports some Social Security income at year t+1 and zero otherwise, conditional on reporting no Social Security income at year t. Accordingly, a value of zero indicates delaying SS claiming for at least one year. $Job\,Loss_{it}$ is equal to one if worker i experienced a job loss at year t and zero otherwise. $Max\,Benefit_{st}$ is the maximum amount of unemployment benefits provided by state s at year t (expressed in \$1,000s and demeaned relative to the average of the 46 states). ζ_{st} denotes state-year fixed effects and holds other state-wide policies and shocks constant. X_{it} is a vector of person-specific controls, ϵ_{ist} is an idiosyncratic error term and α is an intercept term. Among workers of a given age, $\beta_{1_{Age}}$ is the average propensity to initiate Social Security benefits at year t+1 in response to a job loss occurring at year t compared to a non-job loser in the state with the average generosity of unemployment benefits. Among job losers, $\beta_{2_{Age}}$ quantifies the average differential response between job losers having access to unemployment benefits of different generosity to an additional \$1,000 of maximum state unemployment benefits.[28]

I estimate this specification separately for workers of age 61, 62, 63 and 64. The set of estimated $\hat{\beta}_{1_{Age}}$'s shown in table 5 document that following a late career job loss, job losers have a higher average propensity to immediately initiate their Social Security benefits. On the other hand, the set of coefficients' estimates $\hat{\beta}_{2_{Age}}$'s show that UI benefit generosity reduce job loss-motivated early SS benefits claiming leading workers to opt for a higher benefit amount by claiming later. For instance, $\hat{\beta}_{1_{61}}$ shows that following a job loss at age 61, job losers are 26% more likely than non-job losers to initiate their Social Security benefits immediately after at age 62 in the state with the

[28] I remove a very limited number of observations corresponding to workers who moved between states, as well as those who ever reported disability as a reason for claiming social security.

average generosity of state unemployment benefits. However, $\hat{\beta}_{2_{61}}$ shows that a \$1,000 increase in state unemployment benefits reduces this likelihood by 4.5 percentage points. A \$5,900 increase in $Max\,Benefit_{st}$ fully reduce the average propensity of job losers' early claiming down to the same propensity of early claiming by non-job losers. Similarly, $\hat{\beta}_{1_{62}}$ shows that workers experiencing a job loss at age 62 are also 24% more likely to have their stream of benefits running the year after at the state with the average level of maximum unemployment benefits. However, $\hat{\beta}_{2_{62}}$ shows that a \$1,000 additional maximum state unemployment benefits reduces this likelihood by 9.1 percentage points. Accordingly, a \$2,600 increase in $Max\,Benefit_{st}$ can make job losers on average not more likely to claim immediately after than non-job losers. A job loss at age 63 produces the same effect with 48% higher likelihood of social security receipt at 64. $\hat{\beta}_{2_{63}}$ has an economically meaningful effect in reducing this likelihood by 11.6 percentage points while being statistically insignificant. Finally, for those age 64, the small and statistically insignificant $\hat{\beta}_{1_{64}}$ points to no statistically meaningful difference between job losers and non-job losers claiming at 65. Consistently, the economically and statistically insignificant coefficient estimate $\hat{\beta}_{2_{64}}$ indicates that state unemployment benefits provide no incentive for job losers to delay claiming beyond age 65, the full retirement age.

[Table 5 about here]

7.1 Intertemporal considerations

Delaying Social Security entails forgoing current benefits in exchange for higher future benefits. A one year delay in claiming raises future benefits by 6.67% of the worker's primary insurance amount. A number of studies emphasize that delaying the claiming decision is financially advantageous for individuals with average life expectancy and particularly for couples [Coile et al. 2002; Maurer et al. 2019; Meyer and Reichenstein 2010; Shoven and Slavov 2014]. The exact income and utility gains from a delay are person-specific and depend on subjective mortality expectations, intertemporal elasticity of substitution, rate of time preference and the worker's primary insurance amount.[29]

[29] In Appendix H, I use some assumptions to estimate the resulting increase in the expected present discounted value of the stream of benefits from an optimal delay for a single worker to be 0.62 and 3.34 PIAs for men and women respectively. Gains from a delay can be higher for married couples, particularly through

However, job losses raise the marginal value of early SS benefits leading to a pattern of early claiming by job losers despite the financial gains from a delay. In contrast, unemployment benefits reduce the marginal value of early SS benefits. As unemployment benefits increase, more job losers, who would otherwise claim immediately following a job loss, become more likely to delay claiming. I quantified the additional amount of unemployment benefits that would fully eliminate the average excess propensity of early claiming by job losers compared to non-job losers. By incentivizing job losers to delay claiming, unemployment benefits also raise future Social Security income leading to a net increase in the expected present discounted value of the resources available to workers for retirement.

8 Implications for the Social Value of UI

The availability of non-penalized 401(k) withdrawals has important implications on the willingness to pay for unemployment insurance. The framework of Baily (1978) and Chetty (2006) emphasizes that the social value of unemployment insurance emanates from its ability to smooth a drop in consumption following job loss events. While I do not directly observe consumption, the results in Table 3 show that the magnitude of job losers' reliance on 401(k) withdrawals triggered by the removal of the penalty, $5900, largely matches the average earnings loss associated with job loss events consistent with a significant role of 401(k)s as self-insurance devices against unemployment shocks as theorized by Love (2006) and Stiglitz and Yun (2005).[30] Consequently, at least for those with 401(k) accounts, the removal of the penalty implies the availability of a form of self-insurance that, by replacing part of the income lost due to job loss, may be seen as a reduction in the Marginal Value of Public Funds (MVPF) allocated to UI by being a substitute to it.[31] However, these large job loss-induced pension

its effects on survivors' benefits [Coile et al. 2002; Meyer and Reichenstein 2010; Shoven and Slavov 2014].

[30]Estimates in the literature document a job loss-induced loss of earnings in the range of 25-35% [Farber 2017; Huff Stevens 1997; Stephens 2001]. Similarly, in Appendix G, I document a 30% decline in annual earnings specifically in the year of the job loss (around $8,200 based the summary statistics in table 1). Other studies document the persistence of these shocks to earnings [Huff Stevens 1997].

[31]The Marginal Value of Public Funds (MVPF), a measure of the usefulness of public funds, introduced by Hendren and Sprung-Keyser (2020), is the ratio of the Willingness To Pay (WTP) for unemployment insurance to its net fiscal cost to the government. The WTP for UI is proportional to the drop in consumption

withdrawals are likely to cause future consumption declines after retirement that need to be examined in future research in addition to the full ramifications of late-career unemployment shocks on older workers' quality of life after retirement.

9 Conclusions

This paper documents a precipitous depletion of pension wealth after late-career unemployment shocks. These depletion decisions are highly sensitive to the tax-price of accessing pension accounts. Unemployment insurance alleviates job loss-related liquidity constraints leading workers to slow down their pension asset decumulation and avoid the loss of market returns on their 401(k) savings. Similarly, unemployment insurance incentivizes older unemployed workers to delay their Social Security claiming decisions and opt for a higher stream of Social Security income. These results shed light on an unnoticed positive role of unemployment insurance on retirement income adequacy. They show that unemployment insurance increases future retirement income, particularly for individuals with late-career job losses.

This study has important implications impacting nearly a million older unemployed workers in the U.S. The importance of these results for older workers emanates from the timing of the documented pension withdrawal decisions. Pensions assets depleted at a near-retirement stage are less likely to be replaced. The loss of market returns associated with these pension withdrawals is likely to leave older workers with reduced retirement income and increased vulnerability to later-life poverty. These effects are likely to become even more relevant in light of the increased financial vulnerability of the near-retirement population [Lusardi et al. 2020]. To support this point, I show that the mitigating effect of unemployment benefits on pension asset decumulation is stronger for liquidity constrained workers, those who lack savings outside of retirement accounts.

due to job loss.

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Tables and Figures

Table 1: Wealth, Retirement Accounts and Earnings for the near-retirement (50-59 years old) Population

Retirement Accounts	Mean	Median	Std. dev.	Obs.
Near-retirement workers				
IRAs	9,151.3	0	31,657.2	55,245
401(k)	13,203.0	0	39,614.0	55,245
Annual Earnings	27,225.9	19,710	35,743.4	55,245
Near-retirement Job Losers at the timing of the Job Loss				
IRAs	8,122.9	0	30,957	1,392
401(k)	11,837.4	0	37,807.4	1,392
Annual Earnings	20,445.6	14,712	24,838.8	1,392

Liquid Wealth	in Own Name		Jointly with spouse	
Asset Type	Mean	Std. dev.	Mean	Std. dev.
Checking Accounts	142.0	632.5	146.1	503.6
Interest Earning Accounts	3,026.3	12,922.9	3,728.2	11,968.3
Bonds	1,063.8	22,126.2	745.2	9,628.9
Stocks and Funds	14,254.0	650,609	13,385.4	667,111.1
Total Liquid Assets	18,485.9	656,093.5	18,004.9	667,630.2

Total Liquid Assets ($) owned jointly and independently	Mean	Median	Std. dev.	$10^{th} pctile$	$25^{th} pctile$	$75^{th} pctile$	$90^{th} pctile$
	36,490.8	1,300	936,207.9	0	1.0	12,346	60,714

	Mean	Median	Std. dev.	Obs.
Housing Wealth				
Monthly Rent or Mortgage	526.1	425	563.6	55,245
Home Equity	82,637.9	52,000	107,817.7	55,245

Note: This table provides unconditional summary statistics of assets held in tax-deferred retirement accounts (reported in own name), liquid non-tax-deferred assets, credit card and store bills and measures of housing wealth for the sample of 50-59 years old workers. The sample contains 55,245 worker-year observations. Measures of assets and liabilities are obtained from the SIPP topical modules accompanying waves 3,6,9 and 12 (where available). Median asset holdings in all types of accounts are zeros. Individuals' annual earnings are obtained by summing the stream of monthly earnings over each year of data. Workers who move between states are removed from these summary statistics. Values are reported 2000's dollars.

Table 2: Unemployment Insurance State Benefit Generosity (1996-1999) and (2001-2003)

	State UI Benefits		
	Mean	Median	Std. dev.
Weekly Benefits ($1,000)	0.31	0.3	0.09
Benefits Duration (Weeks)	26.17	26	0.82
Maximum Benefits ($1,000)	8.14	7.77	2.61
Increase in Maximum Benefits ($1,000) over the period 1996-2003	2.21	2.07	1.29
% Increase in Maximum Benefits over the period 1996-2003	32	31	15
Number of States		46	
States-Year		322	

Note: This table provides summary statistics of for the legal parameters defining the generosity of state unemployment benefits through the period of the study (1996-1999) and (2001-2003). Source: Data on the significant provisions of state UI laws are provided by the U.S. Department of Labor and compiled and made available by Hsu et al. (2018). Values reported in nominal dollars.

Table 3: Job Loss-motivated 401(k) Pension Asset Withdrawal by the near-retirement population (age 50-59 years old)

	(1) $\Delta log(401(k)Assets+10)$	(2) $\Delta \text{Sinh}^{-1}(401(k)Assets)$	(3) $\Delta log(IRA\,Assets+10)$	(4) $log(401(k)Assets+10)$
$JobLoss_{it} \times 1[Age>55]$	-0.511*	-0.654*	0.0337	-0.432**
	(0.287)	(0.396)	(0.250)	(0.172)
$JobLoss_{it}$	-0.0596	-0.132	-0.0793	0.127
	(0.142)	(0.195)	(0.115)	(0.0872)
1[Age>55]	-0.0433	-0.0782	-0.0148	-0.00510
	(0.0847)	(0.114)	(0.0797)	(0.0549)
Person time-varying controls	✓	✓	✓	✓
Person FE	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓
Observations	32,090	32,090	32,090	32,090
R-squared	0.286	0.288	0.270	0.860

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification 2 for the population of age 50-59 years old with 401(k) withdrawals being the dependent variable using two alternative wealth transformations: $\Delta\, log\,(401(k)Assets+10)$ in column (1) and $\Delta\ Sinh^{-1}(401(k)Assets)$ in column (2)). The estimate in column (1) shows that a job loss after age 55 leads to a 51 percent larger decline in 401(k) pension savings compared to a job loss prior to age 55, holding person's own asset growth rate constant. Economically and statistically insignificant response of IRA assets reported in column (3) indicates that flows out of 401(k) pensions were not *rolled over* to IRA accounts, which implies a leakage of retirement savings out of the tax-deferred pension system. Column (4) provides results from a log specification as a robustness test. Person time-varying controls include lagged versions of other liquid taxable assets held by the worker, earnings, credit card debt, store bills and rent (or mortgage payments). Workers who move between states are removed from this regression. Regressions are weighted using SIPP-provided sample weights. Standard errors are clustered at the worker's level.

Table 4: The Mitigating Effects of Unemployment Insurance on 401(k) Asset Decumulation by older unemployed workers and the role of self-insurance assets (financial assets held outside of retirement accounts)(Population age 50-59 years old)

	$\Delta\, log\,(401(k) Assets + 10)$			
	(1)	(2)	(3)	(4)
$Max\, Benefits$ (\$1000) $\times\, On\ Layoff$	0.0720***	0.0697***		0.0913***
	(0.0209)	(0.0203)		(0.0213)
$Max\, Benefits$ (\$1000) $\times\, On\ Layoff \times Liquid\, Assets$				-0.0925***
				(0.0328)
$Max\, Benefits$ (\$1000) $\times\, Job\, Loss_{it}$			0.0430*	
			(0.0237)	
$On\ Layoff$	-0.184*	-0.194*		-0.166*
	(0.100)	(0.101)		(0.0943)
$Job\, Loss_{it}$			-0.236**	
			(0.110)	
$Max\, Benefits$ (\$1000)		0.0266		
		(0.0535)		
Person time-varying controls	✓	✓	✓	✓
Person FE	✓	✓	✓	✓
State-Year FE	✓	✗	✓	✓
State-Year Controls	✗	✓	✗	✗
State FE	✗	✓	✗	✗
Year FE	✗	✓	✗	✗
Worker-Year Observations	32,090	32,090	32,090	32,090
Number of Workers	13371	13,371	13,371	13,371
Number of States	46	46	46	46
R^2	0.286	0.281	0.287	0.288

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification 4 for the near-retirement population (50-59 years old) with 401(k) asset growth as the dependent variable in two specifications with (column (1)) and without state-year fixed effects (column (2)). Person time-varying controls include lagged versions of other liquid taxable assets held by the worker and those jointly held with spouse, earnings, credit card debt, store bills and rent or mortgage payments. In column (2), state-level controls include lagged versions of wage levels, per capita income and unemployment rates. In column (3), I use my other measure of unemployment, $Job\, Loss_{it}$, as a robustness check and report a relatively similar estimate. In column (4), I include an additional interaction term between layoff status, unemployment benefit generosity and precautionary non-retirement savings held outside of retirement accounts (including checking and savings accounts, bonds and stocks measured in \$100,000s), in addition to all pairwise combinations of these three variables. Workers who move between states are removed from this regression. Regressions are weighted using SIPP-provided sample weights. Standard errors are clustered at the state level.

Table 5: The Mitigating Effect of Unemployment Insurance on Early Social Security Claiming Behavior

	$Pr[SS\ Income_{t+1} > 0 \mid SS\ Income_t = 0]_{ist_{Age}}$
Panel A: Individuals age 61	
Job Loss	0.263***
	(0.0785)
$Max\ Benefits(\$1000) \times$ *Job Loss*	-0.0448*
	(0.0260)
State-Year FE	✓
Observations	1,268
R^2	0.157
Panel B: Individuals age 62	
Job Loss	0.243**
	(0.109)
$Max\ Benefits(\$1000) \times$ *Job Loss*	-0.0906**
	(0.0354)
State-Year FE	✓
Observations	814
R^2	0.147
Panel C: Individuals age 63	
Job Loss	0.477***
	(0.162)
$Max\ Benefits(\$1000) \times$ *Job Loss*	-0.110
	(0.0912)
State-Year FE	✓
Observations	540
R^2	0.217
Panel D: Individuals age 64	
Job Loss	0.0904
	(0.0881)
$Max\ Benefits(\$1000) \times$ *Job Loss*	0.0116
	(0.0725)
State-Year FE	✓
Observations	434
R^2	0.232

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table provides the coefficient estimates for specification 5 estimated separately for individuals of age 61, 62, 63 and 64. For workers age 61, 62 and 63, a job loss increases the propensity to initiate Social Security benefits immediately after at 62, 63 and 64 respectively. State unemployment benefit generosity reduces this likelihood and incentivizes older job losers to delay their Social Security benefits claiming. Unemployment benefits do not incentivize delays in social security benefit receipt beyond the full retirement age, 65. All regressions control for gender, marital status and lagged earnings. Workers who move between states are removed from these regressions. Regressions are weighted using SIPP-provided sample weights. Standard errors are clustered at the state level.

Figure 1: Age Profile of IRA and Employer-Sponsored 401(k) Assets.

Figure 1A

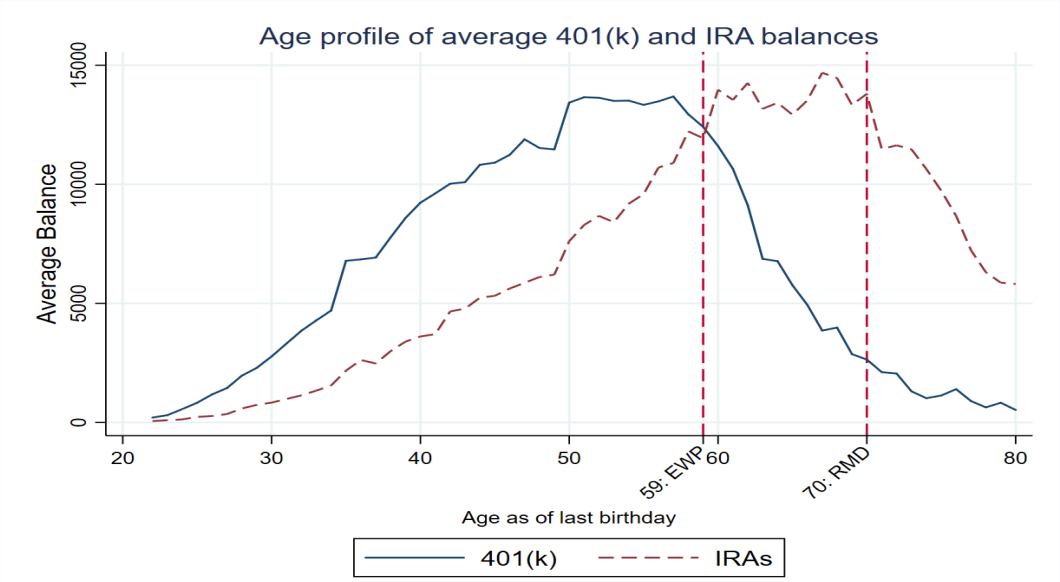
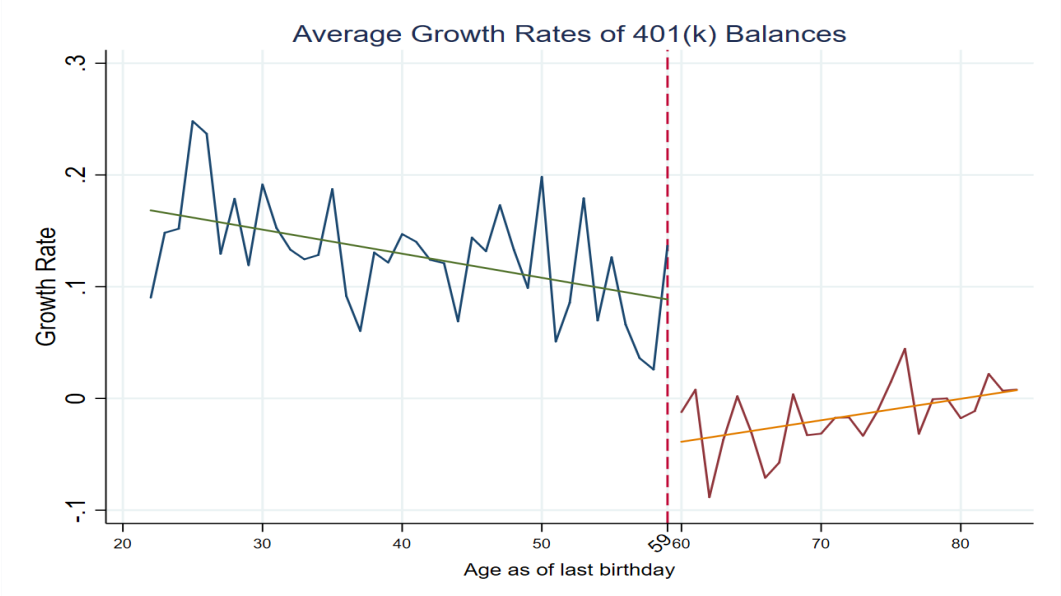


Figure 1B

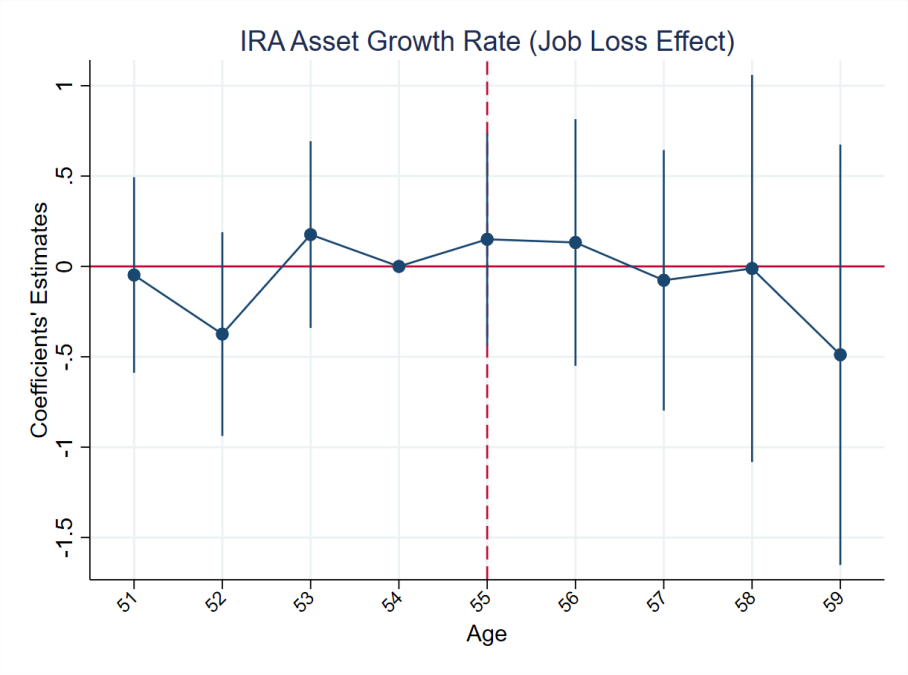


Note: The upper figure illustrates the age profile of the population average asset holdings (in 2000's \$) in IRA and 401(k) accounts. The two dashed vertical lines indicate the $59\frac{1}{2}$ and $70\frac{1}{2}$ age thresholds, corresponding to the removal of the Early Withdrawal Penalty and the Required Minimum Distribution respectively. The lower figure illustrates the age profile of the average growth rate of 401(k) asset holdings ($\Delta\, log\,(401(k) Assets + 10)$). The dashed vertical lines indicates the $59\frac{1}{2}$ age threshold, corresponding to the full removal of the Early Withdrawal Penalty. Two lines are fitted before and after the removal of the penalty. A one-off step decline in 401(k) asset growth rates is observed immediately after the removal of the penalty at age $59\frac{1}{2}$. Source: SIPP 1996 and 2001 Asset topical modules.

Figure 2: Job Loss-induced Depletion of 401(k) after Age 55 IRAs are used as a Placebo



(A)



(B)

Note: The figure plots the coefficients' estimates for specification 3. Following a job loss after age 55, workers significantly deplete their 401(k) wealth relative to workers' own personal rate of 401(k) asset growth, compared to a job loss before age 55. Job losers' IRA assets are irresponsive to the age 55 threshold (Placebo). Workers who move between states are removed from this regression. Regressions are weighted using SIPP-provided sample weights. Standard errors are clustered at the worker's level.

Late-career Unemployment Shocks, Pension Outcomes and Unemployment Insurance

Online Appendix

A Data and Variables Definitions:

A.1 Data Representativeness and Structure

The Survey of Income and Program Participation (SIPP) is designed to be a nationally representative sample of individuals 15 years of age and older in the civilian non-institutionalized population. The data used are from the 1996 and 2001 panels of the Survey of Income and Program Participation. SIPP includes core waves and topical modules. Core waves are used to collect information on workers' labor market histories, earnings and Social Security (SS) income receipt. The 1996 panel provides 12 core waves of data spanning the period 1996-1999 while the 2001 panel provides 9 waves spanning the period 2001-2003. Topical modules are the source of information on workers' asset holdings including assets held in retirement accounts, 401(k)s and IRAs. Asset data are collected on a yearly basis along with waves 3,6,9 and 12 (where available). Accordingly, the 1996 SIPP panel tracks asset data for four consecutive years while the 2001 panel tracks asset data for three years. Using both core and topical modules, I link workers' labor market histories to their pension outcomes based on the following timing of data collection. Each set of consecutive three cores of SIPP (waves 1-3, 4-6, 7-9 and 10-12) cover approximately a calendar year. Asset data are collected approximately at the end of the calendar year or at the beginning of the following year depending on the rotation schedule determining the date of the interview.

Data Collection Cycle:

Regarding the 1996, the panel spans December 1995-February 2000 and contains twelve waves where each wave covers a period of four months. The sample is divided into four groups interviewed consecutively but in an overlapping manner. The panel contains four different spans. They are December 1995 to November 1999, January 1996 to December 1999, February 1996 to January 2000, and March 1996 to February 2000. For instance, wave 1 starts in 12/1995 and contains four monthly observations ending in 3/1996 for group 1. The same wave starts in 1/1996 and ends in 4/1996 for group 2. For group 3, the first wave starts in 2/1996 and ends in 5/1996. Finally, wave 1 starts in 3/1996 and ends in 6/1996 for the fourth group in the sample. These four months cycles continues for twelve waves in the same manner to end by the twelfth wave spanning 8/1999-11/1999, 9/1999-12/1999, 10/1999-1/2000 and

11/1999-2/2000 for groups 1, 2, 3 and 4 groups respectively. A same pattern is repeated for the 2001's panel for nine waves. For group 1, the first wave spans February 2001 to May 2001. Wave 1 starts for the three other groups successively.

I collect individual-level asset from the topical modules covering asset holdings. The topical modules are associated with waves 3, 6, 9 and 12 (where available). Once per year, the topical modules collect data on asset holdings for the four rotation groups. The data is collected approximately by the end of each calendar year. For instance, wave 3 of the 1996 panel collects asset data in December 1996 for group 1, January 1997 for group 2, February 1997 for group 3 and March 1997 for group 4. Wave 6 repeats the same cycle by collecting asset data in December 1997 for group 1, January 1998 for group 2, February 1998 for group 3 and March 1998 for group 4.

Accordingly, using these topical modules allows me to collect four annual asset data points for the 1996 panel and three data points for the 2001 panel and link these asset data to workers' labor market histories.

A.2 Tax-Deferred Asset Data

Similar to Gelber (2011), I use the 401(k) asset variable labeled *taltb* and provided in the annual topical modules in response to the following survey question: *As of the last day of the reference period, what was the total balance or market value (including interest earned) of any 401K or thrift plans held in ...'s own name?* The IRA asset information is retrieved from workers' responses to the survey question: *As of the last day of the reference period, what was the total balance or market value (including interest earned) of the IRA accounts in ...'s OWN name?*

A.3 Data on Other Financial Assets

SIPP also provides data on assets held in checking and savings accounts, in addition to ownership of bonds and stocks. The data is reported by SIPP in terms of data held in own name and those held jointly with spouse and also reported by the annual topical modules on assets using the following variable names: TALJCHA (Estimate of a joint non-interest check

account), TALICHA (Estimate of own non-interest checking Account), TIAITA (Amount in own interest earning account), TIAJTA (Amount in joint interest earning account), TIMJA (Amount in joint bonds/US securities), TIMIA (Amount of bonds/securities in own name), ESMJV (Value of joint stocks/funds owned with spouse) and ESMIV (Value of stocks/funds in own name). In table A1, I provide full summary statistics for asset holdings of the working-age population (22-65 years old).

A.4 Labor Market History Data

These end-of-year pension asset outcomes are then linked to workers' labor market histories during the year. Similar to Chetty (2008), I use weekly employment status provided by the survey variable *RWKESR* to construct a worker-year-level layoff indicator that is equal to one if a worker experienced some weeks of unemployment during the year (where a calendar year spans three consecutive waves: waves 1-3, 4-6, 7-9 and 10-12 respectively). Weekly employment status can take any of the following values: (1) With job/business - working, (2) With job/business - not on layoff, absent w/out pay, (3) With job/business - on layoff, absent w/out pay, (4) No job/business - looking for work or on layoff and (5) No job/business - not looking and not on layoff. I code *weekly Layoff status* to be equal to one for responses of (3) or (4) and zero otherwise. I then compute the number of layoff weeks during a given year and set the variable *Layoff* to be equal to one if the worker had some weeks of layoff during a given year and zero otherwise.

I also identify the timing of a $Job\,Loss_{it}$ to be a change in the *Layoff* variable from 0 to one (conditional on the person not being out of the labor force). Accordingly, the $Job\,Loss_{it}$ variable identifies the exact point of time (Age-Year) at which the layoff event took place. I use this variable to identify eligibility for 401(k) penalty-free withdrawals. On the other hand, the *Layoff* variable is used to identify workers' eligibility for unemployment insurance.

A.5 The *"Not in the labor force"* population

I use the same weekly employment status variable *RWKESR* to determine whether an individual is on the labor force. For that purpose, I count the number of weeks during which an individual reported his / her employment status to be *No job/bus - not looking and not on*

layoff. Accordingly, I consider an individual to be retired if he / she report being unemployed and not looking for a job during all weeks of the years.

A.6 Social Security Income Receipt Data

Social Security income receipt is provided by the two variables *T01AMTA* and *ER01A* that provide information on monthly Social Security income receipt. To identify the exact Age-Month point at which individuals started collecting their benefits, I identify the transition timing from no Social Security income to some Social Security income reported. I then truncate this exact age to the smallest age integer. For the empirical analysis conducted in section 7 of the paper, I use the transition from no Social Security income at year t to some Social Security income reported in the following year t+1 as an indicator of Social Security benefits initiation.

The Social Security claiming behavior I document in the data [Figure A.1] is broadly consistent with Munnell and Chen (2015) and with the Social Security Annual Statistical Supplement.[32] I document 3,036 events of Social Security benefits initiation for individuals in the age range 62-70. Among these, approximately 42% of these benefits initiation took place at age 62 for men. At the full retirement age, 65, I observe a second spike representing 17.5% of these claiming events. For women, I find a larger spike of approximately 46.5% at age 62. The spike at 65 is much less pronounced for women with both claiming at 64 and 65 being approximately equally likely [See histograms for men and women: Figure A.2].

These figures are consistent with the full population data provided by the Social Security Annual Statistical Supplement. The figures reported using administrative data point to the fact that the spike at 62 for men is in the range of 41-50% during the time frame of the study 1996-2003. The spike at 65 is in the range of 14-23% during the same time frame. For women, the spike at 62 is within the 48-57% range during the period 1996-2003. Claiming at 64 and 65 seem to be equally likely at most years

[32] https://www.ssa.gov/policy/docs/statcomps/supplement/2019/6b.html#table6.b5.1

A.7 Demographic Characteristics

Demographic characteristics of the near-retirement sample approximately match U.S. population averages for similar age categories as reported by the 2000 Census. This includes the distributions of educational attainment, race, martial status, and gender. About 15.8% of the sample have less than a high school diploma, 31.9% are high school graduates, and 25.9% have a bachelor's degree or higher.[33] About 68.5% of the sample are married, and about the 52.5% of sample are women corresponding approximately to the sex ratio among that age category at year 2000.[34] In table A2, I provide summary statistics information for demographic variables computed using SIPP for the near-retirement population (50-59 years old) compared to relatively similar age categories provided by the 2000's Census. On average, I show that SIPP data generally match the U.S. population averages.

[33] Almost similar population averages educational attainment could be obtained using the Census Statistics for similar age categories in 2000. https://www.census.gov/topics/education/educational-attainment/data/tables.2000.html

[34] I compare all educational and demographic characteristics of the sample with the relevant statistics provided by the U.S. 2000's census to ensure that the sample at hand approximately matches the same average characteristics for similar age categories in the United States in 2000.

Table AI: Summary Statistics: Retirement Accounts and Financial Asset holdings of the working age population (22-65) years old

	Retirement Accounts (Own Name)					
Asset Type ($)	Mean	Median	Std. dev.	Obs.	No. Workers	Account Ownership Rate
IRAs	4,975.8	0	22,941.5	287,623	104,031	19.3%
401(k)	7,975.7	0	28,831.6	287,623	104,031	28.2%

	in Own Name			Jointly with spouse		
Asset Type ($)	Mean	Median	Std. dev.	Mean	Median	Std. dev.
Checking Accounts	137.5	0	598.6	121.5	0	448.8
Interest Earning Accounts	1978.4	0	9,956.3	2,497.5	0	9,531
Bonds	578.9	0	15,577.3	456.2	0	7762.2
Stocks and Funds	6,428.4	0	314,450	8,419.7	0	462,085.2
Credit Card and Store Bills	890.2	0	19,295	913.7	0	14,982.6

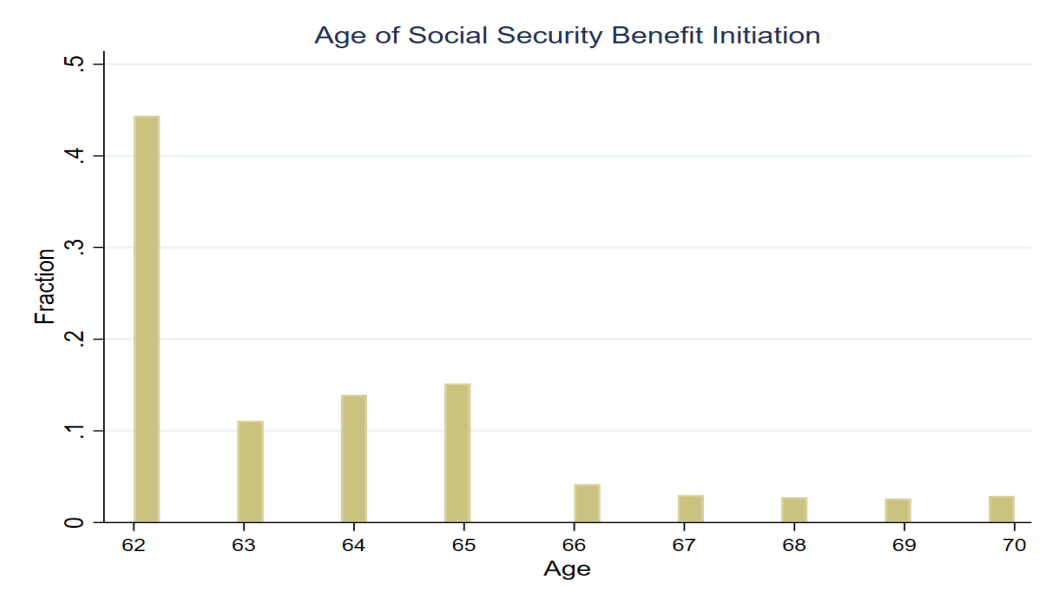
Note: This table provides summary statistics of assets held in tax-deferred retirement accounts (reported in own name), other liquid taxable savings and credit cards and store bills debt (reported in own name and jointly with spouse) for the working-age, 22-65 years old, population. The sample contains 287,623 worker-year observations. Asset values are reported in 2000's dollars. Values are obtained from the SIPP asset topical modules accompanying waves 3,6,9 and 12 (where available).

Table AII: Education and Demographic Characteristics for the near-retirement 50-59 year old population

	SIPP (50-59 years old)	Census 2000
Education		
Less than high school diploma	17.1%	16% (55-59 yrs old)
High school diploma	31.9%	35.3% (55-59 yrs old)
Some college, diploma or associate degree	27.7%	23.7% (55-59 yrs old)
Bachelor's degree or higher	25.6%	25% (55-59 yrs old)
Race		
White	83.4%	82.5% (55-59 yrs old)
Black	12.2%	9.7% (55-59 yrs old)
Other	4.4%	6.4% (55-59 yrs old)
Gender		
Men	47.5%	48.3% (55-59 yrs old)
Women	52.5%	51.7% (55-59 yrs old)
Marital Status		
Married	70%	70.5% (55-64 yrs old)
Widowed	5.5%	7.5% (55-64 yrs old)
Divorced	18.2%	14.5% (55-64 yrs old)
Separated	3.4%	2.1% (55-64 yrs old)
Never Married	6.5%	5.3% (55-64 yrs old)
Number of Workers	22975	

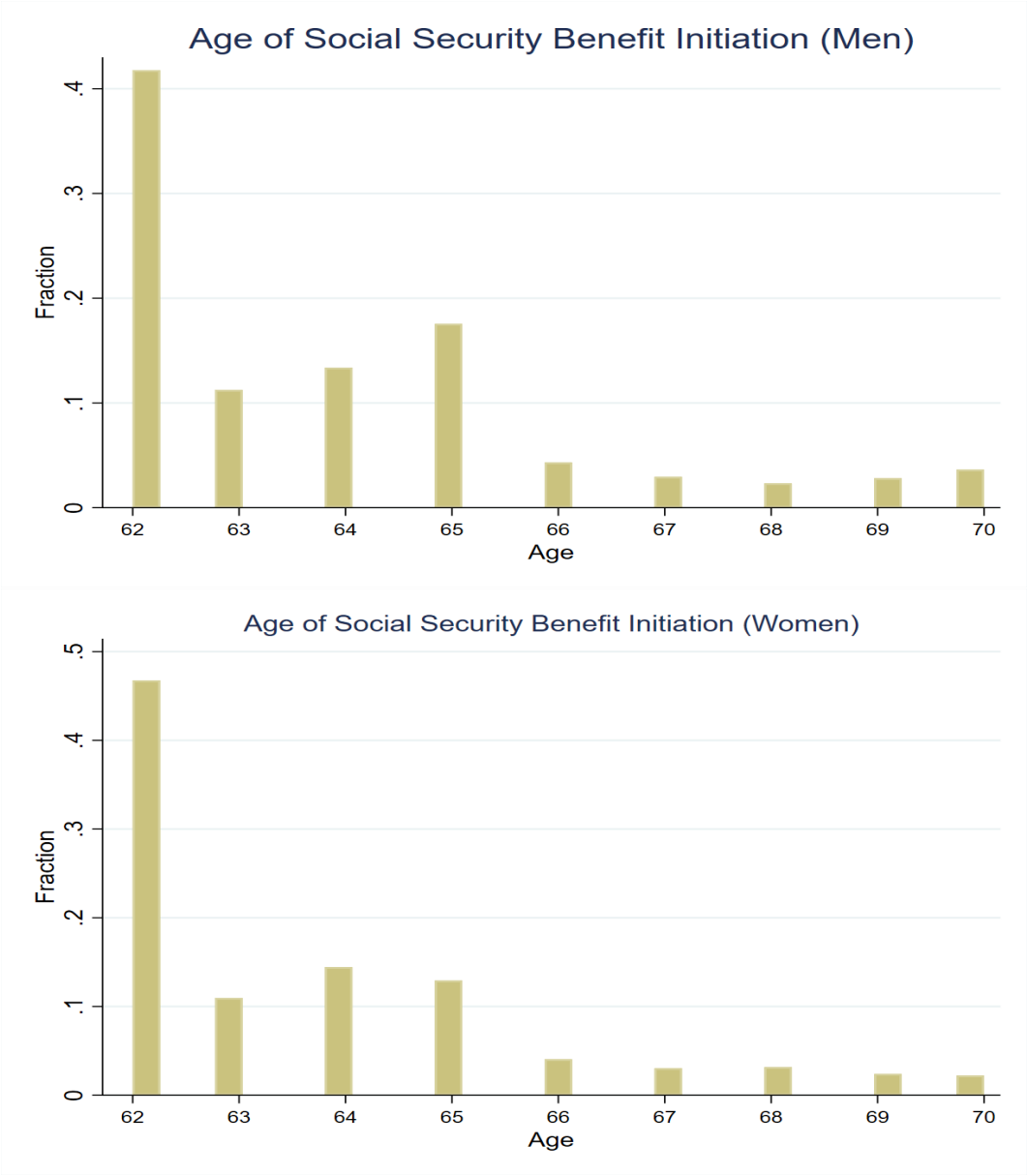
Note: This table provides demographic information for the near-retirement sample, age 50-59 years old. The column titled "*Census 2000*" show that education and demographic characteristics approximately match the known U.S. population averages for relatively similar age categories in 2000 as provided by the U.S. 2000 decennial census. Source: Author's calculation based on the SIPP sample.

Figure AI: Social Security Claiming Patterns



Note: The figure plots the Social Security claiming benefit initiation events documented in the age range 62-70. A large density of claiming events is observed for individuals between their 62nd and 63rd birthday, followed by a smaller spike for individuals between their 65th and 66th birthday. Source: Author's calculation based on the SIPP sample.

Figure AII: Social Security Claiming Patterns (Men and Women)



Note: The figure plots the Social Security claiming benefit initiation events in the age range 62-70. The two figures plots the Social Security claiming trends produced using SIPP data for men (upper figure) and women (lower figure) separately. For men, a large density of claiming events is observed for individuals between their 62nd and 63rd birthday, followed by a smaller spike for individuals between their 65th and 66th birthday. For women, the spike at 65 is much less pronounced. Source: Author's calculation based on the SIPP sample.

B Density analysis

This appendix section tests for a systematic variation in the likelihood of observing job separations around age 55. I find no statistically or economically significant evidence on a systematic relation of that kind in the overall population or within the subset of 401(k) account owners. Workers do not seem to be manipulating the timing of their separation from service to benefit from penalty-free access to their 401(k) pension savings.

In the analysis of the effect of the removal of the early withdrawal penalty on job losers' 401(k) asset withdrawals, identification relies on an abrupt variation in the tax-price of accessing 401(k) assets by the unemployed around age 55. This variation is used to identify the effect of the EWP on the 401(k) asset withdrawals of job losers. A potential threat to this analysis is the probability of manipulation of the running variable; the timing of job separation in this case. This could be the case if employers and older workers jointly manipulate the timing of unemployment to provide workers with the option to cash-out their 401(k)'s penalty-free to help them weather the shock of unemployment.

If, hypothetically, this joint manipulation is prevalent, the 401(k) pension asset outflows documented in this paper may reflect the effect of policy-induced job separations and their related 401(k) distributions, as opposed to the liquidity constrained motives documented in this paper. In light of McCrary (2008), if this discontinuity in the tax-price of accessing 401(k) funds induces strategic job separations at age 55, it would reflect as a discontinuity in the likelihood of observing a job loss around the age cutoff 55.

Two factors weaken the credibility of this threat. First, such manipulation would be costly for firms as it requires them to keep workers, that would otherwise be laid-off, on their payrolls for additional time until they reach the age threshold. Second, being costly for firms, such age-targeting layoff strategy could only be implemented with workers that are very close to turning 55 which seriously limits the potential and the feasibility of such strategy.

To test the hypothesis of a systematic variation in the timing of job separation around age 55, I estimate the likelihood of observing a job separation at each age within the age range 50-59 using the following linear probability model for the population of 401(k) account owners

(and also for the whole near-retirement population, 50-59 years old):

$$Job\,Loss_{iAget} = \alpha + \sum_{A \neq 54} 1[Age_{it} = A] \times D_A + \gamma_t + \epsilon_{iAget} \tag{B.1}$$

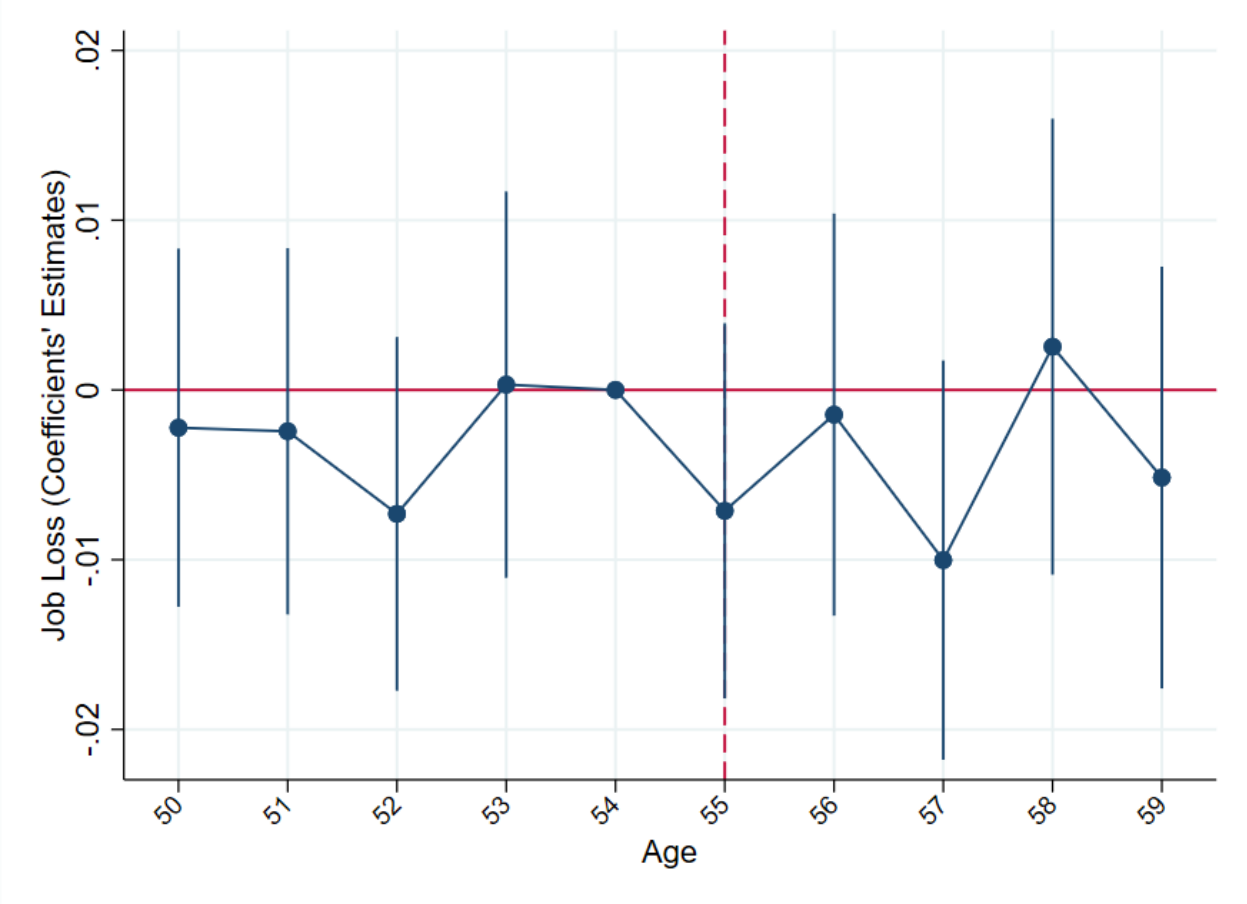
$Job\,Loss_{iAget}$ is an indicator function that equals one at the timing of a job loss for individual i aged Age_{it} at year t and zero otherwise. γ_t denotes year fixed-effects. ϵ_{iAget} is an idiosyncratic error term. Each coefficient D_A quantifies the likelihood of observing a job loss for employees aged A at year t, relative to an omitted category (age 54).

Among the population of 401(k) account owners, Appendix Figure B.1 plots the set of estimated coefficients $\hat{D_A}$'s, showing no evidence of a discontinuity in the likelihood of observing a layoff at the cutoff age or at any age within the age range in question. The almost flat pattern on the $\hat{D_A}$'s significantly lessens the concerns about policy-induced job separations at age 55. Similarly, among the overall population of near-retirement workers, I find no evidence of a systematic tendency to separate from service at age 55 (Appendix Figure B.2).

Reference:

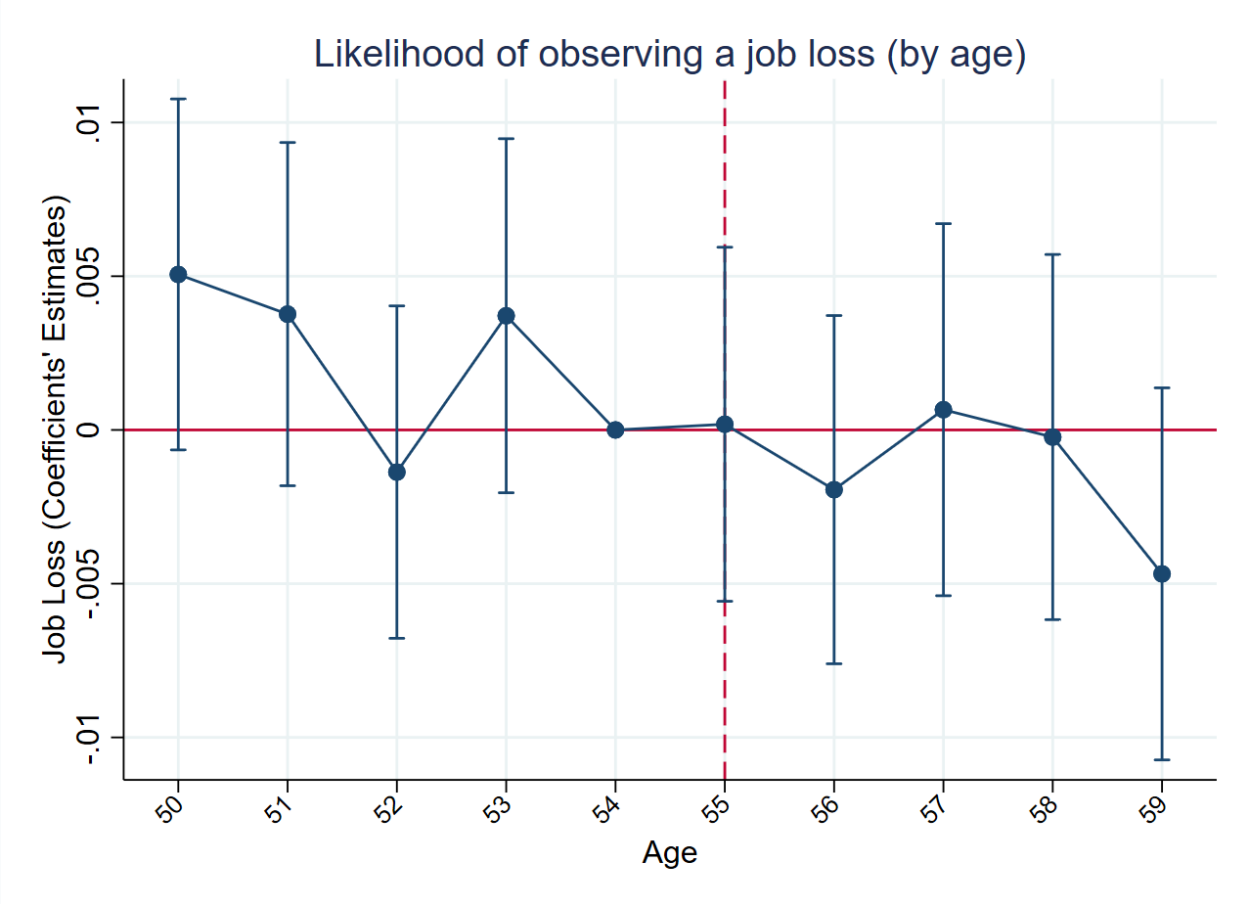
McCrary, Justin. 2008. "Manipulation of the running variable in the regression discontinuity design: A density test". *Journal of Econometrics*, Vol. 142(2), pp. 698–714.

Figure BI: The likelihood of observing a job loss event at each age: Density Analysis (Among the subpopulation of 401(k) account owners)



Note: The figure plots the likelihood of observing a job loss event at each age estimated using specification B.1 estimated using the sub-population of 401(k) account owners. Each estimate quantifies the likelihood of observing a job loss at each age relative to the omitted category (age 54). Among the subpopulation of 401(k) account owners, no discontinuity is observed around the age of the change in the tax price of 401(k) pensions, 55. This result alleviates the concern about the possibility of policy-induced job separations at the age cutoff 55.

Figure BII: The likelihood of observing a job loss event at each age: Density Analysis (Among the overall population)



Note: The figure plots the likelihood of observing a job loss event at each age estimated using specification B.1 estimated using the whole near-retirement population. Each estimate quantifies the likelihood of observing a job loss at each age relative to the omitted category (age 54). No discontinuity is observed around the age of the change in the tax price of 401(k) pensions, 55. This result alleviates the concern about the possibility of policy-induced job separations at the age cutoff 55.

C Relevance of Maximum Benefit $Max\,Benefit$ as a Proxy for State Unemployment Insurance Generosity:

To demonstrate the relevance of $Max\,Benefit$, the product of the maximum weekly benefit and the number of weeks of eligibility, as a proxy for unemployment insurance generosity, I show that $Max\,Benefit$ is a strong predictor of state unemployment insurance compensation (obtained from the Bureau of Economic Analysis) throughout the duration of the study 1996-1999 and 2001-2003. Similar to Agrawal and Matsa (2013) and Hsu et al. (2018), I show that the elasticity of states' unemployment payments to $Max\,Benefit$ is approximately one.

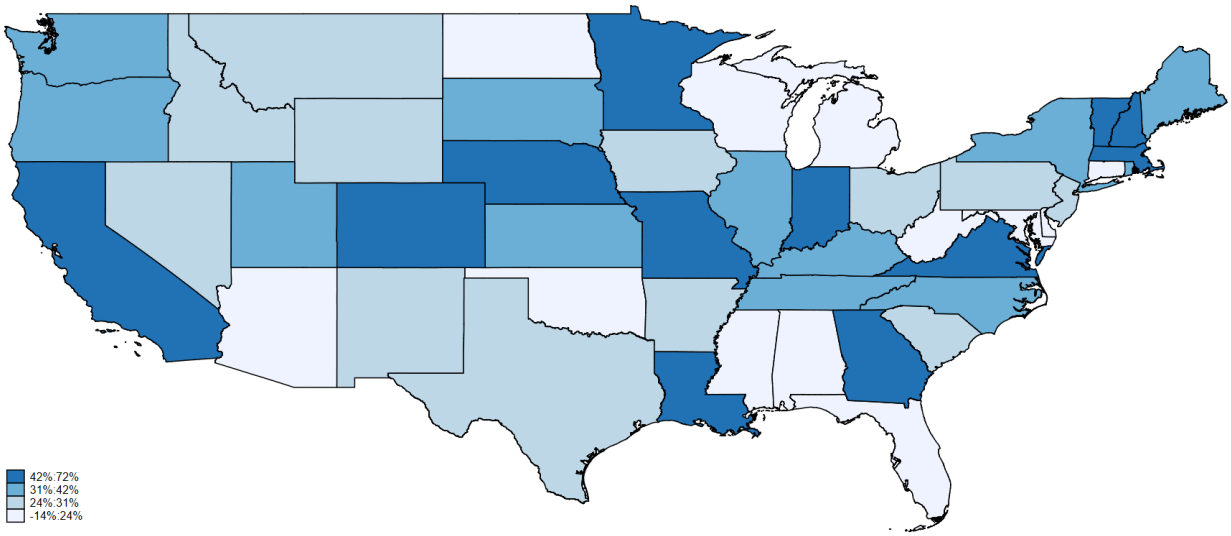
$Max\,Benefit$ and State Unemployment Insurance Compensation

	log UI Payments
$Max\,Benefit$	1.012***
	(0.186)
State FE	✓
Year FE	✓
State time-varying Controls	✓
State-Year Observations	322
R-squared	0.992

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates of state-panel regressions of social insurance payments on state unemployment benefit generosity $Max\,Ben$. The specifications control for state unemployment rate, GDP per capita, average wage and union coverage. Standard errors are clustered at the state level.

Geographic Distribution of Regular State Unemployment Benefits Changes by quartile over the period 1996-2003



Note: The figure describes the geographic distribution of the changes in unemployment insurance over time by quartile. Darker shades of blue indicate larger increases in state unemployment benefits over the period 1996-2003. Source: the U.S. Department of Labor *'Significant Provisions of State UI Laws'*. Data are collected and made available by Hsu et al. (2018)

D Sample Size by Age and Employment Status for the EWP Analysis:

Table D1: Sample Size of employed and laid-off workers with 401(k) accounts at each age for the 50-59 years old population

	Sample Size per Age									
Workers of Age:	50	51	52	53	54	55	56	57	58	59
401(k) Account Owners										
Employed 401(k) owners	1900	1775	1622	1531	1469	1331	1148	1049	895	855
Job losers with 401(k)'s	45	43	38	38	33	33	27	14	23	29
All workers including non-401(k) owners										
Employed	6025	5607	5262	4855	4689	4448	4062	3678	3306	3154
Job Losers	210	198	158	172	152	144	128	126	95	101
Job Separation Rate (%)	3.49	3.53	3.00	3.54	3.24	3.24	3.15	3.43	2.87	3.20
Out of the Labor Force	864	899	900	936	994	1023	1056	1111	1136	1226
No. of workers	22975									
Workers with 401(k)s	7013									
401(k) Ownership Rate (%)	30.52									
Layoff Events	1,476									

Note: This table provides sample size per age including employed and laid-off 401(k) account owners at each age within the age range 50-59 years old. 323 job loss events correspond to individuals with 401(k) accounts. Source: Author's calculation based on the SIPP sample.

E IRA Withdrawals in Response to the Removal of the Early Withdrawal Penalty (EWP):

In this Appendix section, I conduct two tests. First, I show that IRA Withdrawals are not responsive to the removal of the EWP on job loss-motivated 401(k) withdrawals at age 55. Second, I provide evidence on excess IRA withdrawals by the unemployed relative to the employed after age 60 (the penalty is removed at age 59.5).

Similar to the analysis in the body of the paper, I conduct the following test:

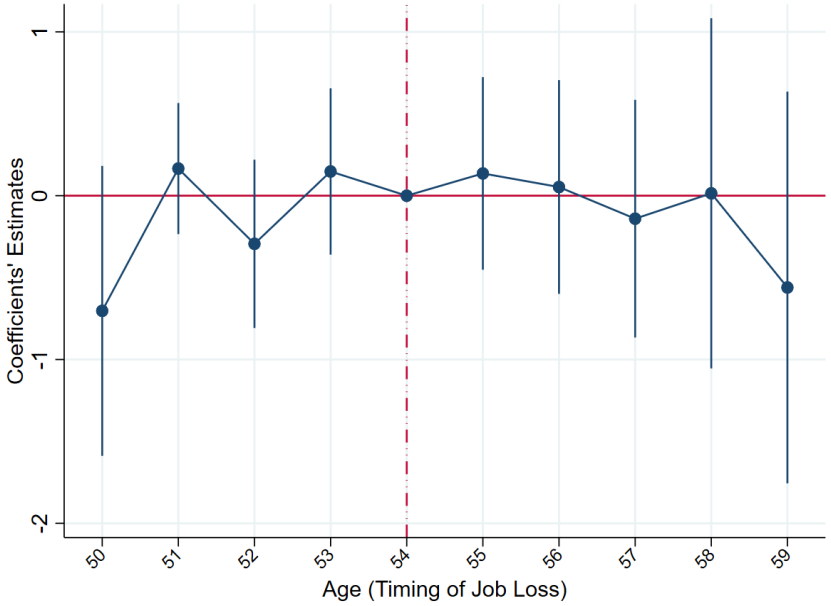
$$Y_{it} = \alpha + \eta_i + \sum_{Age \neq 54} 1[A = Age] \times Job\,Loss_{it} \times \theta_{Age} + \lambda_{Age} + \delta_{it} \tag{E.1}$$

The dependent variable, $Y_{it} = ln(A_{it} + 10) - ln(A_{it-1} + 10)$, is the annual IRA asset withdrawal of worker i of age Age_{it} at year t relative to the worker's lagged asset holdings (IRA asset growth rate), holding the average $(\overline{ln(A_{it} + 10) - ln(A_{it-1} + 10)})$ for each worker constant, by accounting for person fixed-effects η_i.[35] $Job\,Loss_{it}$ is equal to one if worker i got lost her job at year t and zero otherwise. $1[A = Age]$ is an indicator function that equals one at the corresponding age and zero otherwise. By accounting for age fixed-effects λ_{Age}, each coefficient estimate $\hat{\theta}_{Age}$ quantifies the average difference in IRA asset growth rates between the workers experiencing a $Job\,Loss_{it}$ and non-job losers at each age, relative to an omitted age category at age 54. Accordingly, the pattern on the set of coefficient estimates $\hat{\theta}_{Age}$, illustrated in figure E.1, document the age profile of this difference in IRA withdrawal behavior between job losers and employed workers.

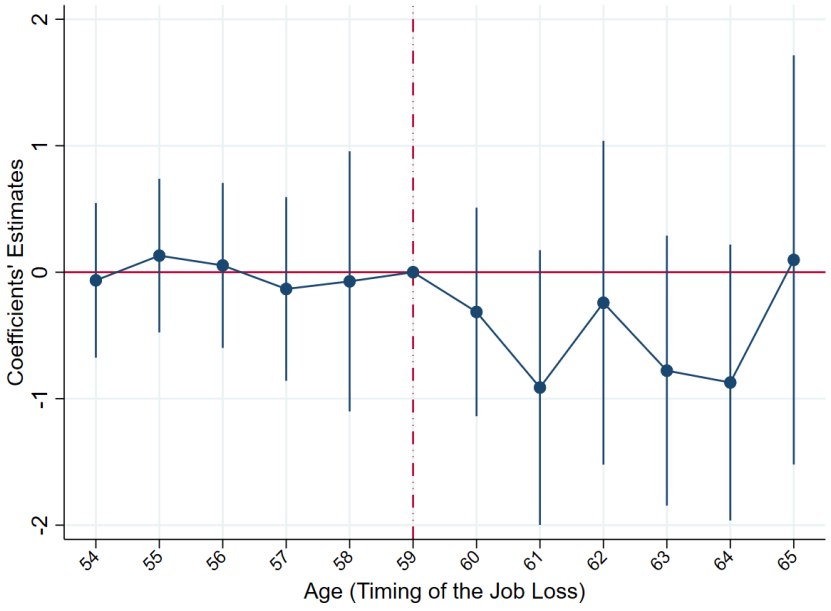
I provide average effects using a simple difference-in-difference specification and provide the results in table E.1. IRA withdrawals are unresponsive to age 55 (since the EWP is removed only on unemployment-motivated 401(k) withdrawals, but not on IRAs). On the other hand, I document an excess decumulation of IRA assets by job losers after age 60 relative to those who lose their jobs prior to age 60 consistent with the removal of the penalty at age $59\frac{1}{2}$.

[35] Similar to Gelber (2011), 401(k) assets are incremented by \$10 so that the natural logarithm is defined for all asset observations including workers having zero assets. Having person fixed-effects, η_i, also controls for 401(k) account ownership. Since non-401(k) owners have zero asset growth, they are absorbed by η_i.

Figure E.1: The Response of IRAs to the age 55 (No Response) and 59.5 (Decumulation) thresholds



(A) IRA Asset Growth Rate of Job losers around age 55 (No Response around age 55 consistent with constant tax-price of accessing IRAs.)



(B) IRA Asset Growth Rate of Job losers around age 60 (Excess Decumulation after age 59.5 consistent with the full removal of the penalty.)

Note: The figure plots the coefficients' estimates for specification E.1. IRA assets are irresponsive to the age 55 threshold (since the EWP is removed only on 401(k) withdrawals, but not on IRAs). On the other hand, a job loss after the removal of the penalty (at age 59.5) increases IRA withdrawals. Standard errors are clustered at the worker's level.

Table E.1: The Response of IRAs to the age 55 (No Response) and 59.5 (Excess Decumulation) thresholds

	(1) $\Delta\, log\,(IRA\, Assets + 10)$	(2) $\Delta\, log\,(IRA\, Assets + 10)$
$Job\, Loss_{it} \times 1[Age > 55]$	0.0306	
	(0.250)	
$Job\, Loss_{it} \times 1[Age > 60]$		-0.597*
		(0.358)
$Job\, Loss_{it}$	-0.0796	-0.0617
	(0.115)	(0.183)
1[Age>55]	-0.0141	
	(0.0795)	
1[Age>60]		0.0535
		(0.107)
Person time-varying controls	✓	✓
Person FE	✓	✓
State-Year FE	✓	✓
Number of Workers	13371	10,568
Observations	32,090	25,371
R-squared	0.272	0.256

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Column (1) shows the unresponsiveness of IRA withdrawals to the age 55 discontinuities. The population of study is the one in the age category 50-59 years old. Column (2) the excess decumulation of IRA assets by job losers after 60 relative to those who lose the job prior to 60. The population included in this specification is the one in the age category 55-64 years old. Person time-varying controls include lagged versions of other liquid taxable assets held by the worker, earnings, credit card debt, store bills and rent (or mortgage payments). Regressions are weighted using SIPP-provided sample weights. Standard errors are clustered at the worker's level.

F Addressing UI Potential Endogeneity Concerns:

F.1 The Specification and its Identifying Assumption

To estimate the effect of UI on the 401(k) asset flows of the unemployed, I estimate the following specification for the near-retirement population (50-59 years old):

$$ln(A_{it}+10) - ln(A_{it-1}+10) = \alpha + \beta_1\, On\ Layoff_{it} + \beta_2\, On\ Layoff_{it} \times Max\, Benefit_{st} + \eta_i + \zeta_{st} + X_{it}\Gamma + \epsilon_{ist} \tag{F.1}$$

By accounting for state-year fixed effects, ζ_{st}, the specification controls for state-wide time-varying factors. Identification relies on the assumption that unemployment benefits are not correlated with factors that might differentially impact the unemployed, relative to the employed. Identification may be violated, leading to a biased estimate of β_2, if unemployment benefits are associated with factors that might influence unemployed workers' decision to withdraw their 401(k) funds differentially than the employed.

F.2 Potential Concern: A Differential Effect of State's Labor Market Conditions (or Social Policies) on the Unemployed relative to the Employed

For instance, while ζ_{st} controls for the state-wide macro conditions, one might worry that the unemployed are particularly impacted by their states' labor market conditions in a more intense way than the employed, leading workers to withdraw more upon job loss.

To lessen this concern, I use a strategy similar to Hsu et al. (2018) and include additional interaction terms of some state labor market conditions and employment status in specification F.1 to allow for these macro factors to have different effects based on employment status. Accordingly, I show that including interaction terms of state-level unemployment rates (and /or state-level per capita income) with the unemployment indicator yields a very similar coefficient estimate, $\hat{\beta}_2$, of the effect of unemployment benefits on the 401(k) asset flows of the unemployed [Table F1].

Similarly, identification may be violated if the generosity of unemployment benefits is correlated with some other policies or state-level characteristics related to the state's social safety

net. To alleviate this concern, I follow a similar strategy and include interaction terms of a wide range of time-varying policies and state-level characteristics including the generosity of AFDC/TANF, the share of the state's population with Medicaid, states' minimum wages, the fraction of state's house that is Democrat and whether the state's governor is a Democrat.[36] Accordingly, I show that allowing for a differential effect of these factors based on employment status, I still obtain a relatively similar estimate, $\hat{\beta}_2$, of the effect of unemployment benefit on 401(k) asset flows of the unemployed [Table F2].

F.3 Potential Concern: A Potential Association Between UI and the Likelihood of a Job Loss

A related concern is a potential association between the likelihood of a job loss and unemployment insurance generosity (This concern is limited by the fact that all effects reported in the paper are conditional on being unemployed). To further lessen this concern, I estimate the effect of unemployment insurance generosity on the likelihood of observing a job loss using the following specification:

$$Job\,Loss_{ist} = \alpha + \beta\ Max\,Benefit_{st} + \eta_s + \gamma_t + \epsilon_{ist} \tag{F.2}$$

Where the dependent variable, $Job\,Loss_{ist}$, is to the timing of worker's i transition from employment to an unemployment. Accordingly, $Job\,Loss_{it}$ equals one if worker i experienced some weeks of unemployment at year t, no weeks of layoff at year t-1 and was not out of the labor force.[37] η_s and γ_t denote state and year fixed-effects respectively. $\hat{\beta}$ estimates the effect of state unemployment benefit generosity on the likelihood of observing a job loss by worker i at state s at year t.

In table F3, I report the estimates, $\hat{\beta}$, for the overall near-retirement population (column (1)) and the subpopulation of 401(k) account owners (column (2)). In both cases, I report economically insignificant effect of the unemployment benefit generosity and the likelihood of

[36] Data on state-level social safety nets and political factors are compiled and made available by the University of Kentucky Center for Poverty Research.

[37] I consider an individual to be not in the labor force if he /she reports being unemployed but not looking for a job during all weeks of the year.

observing a job loss.

F.4 Potential Concern: Unemployment Duration as a Channel

A similar concern may emanate from the effect of unemployment insurance on unemployment duration. For instance, if unemployment insurance generosity is associated with longer unemployment durations, this could also violate the identifying assumption if longer unemployment spells increase the likelihood of 401(k) withdrawals. If this is the case, the effect of unemployment insurance would be confounded with the effect of unemployment duration.

To alleviate this concern, I control for unemployed workers' total number of weeks of unemployment using the following specification:

$$\begin{aligned} ln(A_{it}+10) - ln(A_{it-1}+10) = \alpha + \beta_1\ On\ Layoff_{it} + \beta_2\ On\ Layoff_{it} \times Max\,Benefit_{st} \\ +\beta_3\ On\ Layoff_{it} \times Weeks\ of\ Unemployment_{it} \times Max\,Benefit_{st} \\ +\beta_4\ On\ Layoff_{it} \times Weeks\ of\ Unemployment_{it} \\ +\eta_i + \zeta_{st} + X_{it}\Gamma + \epsilon_{ist} \end{aligned} \tag{F.3}$$

Where $1[Unemployed]$ is an indicator function that equals if worker i is unemployed and zero otherwise. $Weeks\ of\ Unemployment_{it}$ is the total number of weeks that the worker spent unemployed during year t (demeaned). The specification also allows the effect of unemployment benefits to differ based on the number of weeks of unemployment.

Accordingly, I report in Table F4 a relatively similar estimate of β_2 after having accounted for the effect of unemployment duration on 401(k) asset growth among the unemployed.

Table F1: The Mitigating Effects of Unemployment Insurance on 401(k) Asset Decumulation by older unemployed workers (Population age 50-59 years old) Sensitivity Checks: Controlling for the effect of Labor and Macro Conditions on the unemployed

	$\Delta\, log\,(401(k) Assets + 10)$			
	(1)	(2)	(3)	(4)
$Max\, Benefits$ (\$1000) $\times Unemployed$	0.0720***	0.0847***	0.0756***	0.0850***
	(0.0209)	(0.0262)	(0.0264)	(0.0307)
$Unemployed$	-0.184*	-0.138	-0.185*	-0.138
	(0.100)	(0.0965)	(0.101)	(0.0985)
$State\, Unemployment\, Rate \times Unemployed$		-0.171*		-0.171*
		(0.0892)		(0.0908)
$State\, GDP\, per\, capita \times Unemployed$			-2.88e-06	-2.22e-07
			(9.98e-06)	(1.09e-05)
Person time-varying controls	✓	✓	✓	✓
Person FE	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓
Worker-Year Observations	32,090	32,090	32,090	32,090
R-squared	0.286	0.286	0.286	0.286

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification F.1 for the near-retirement population (50-59 years old) with 401(k) asset growth as the dependent variable. Person time-varying controls include lagged versions of other liquid taxable assets held by the worker and those jointly held with spouse, earnings, credit card debt, store bills and rent or mortgage payments. Column (2), (3) and (4) control for all pairwise combinations of $Unemployed$, $Max\, Benefits$ and / or state macro conditions ($State\, Unemployment\, Rate$ or $State\ GDP\ per\ capita$). Standard errors are clustered at the state level.

Table F2: The Mitigating Effects of Unemployment Insurance on 401(k) Asset Decumulation by older unemployed workers (Population age 50-59 years old) Sensitivity Checks: Controlling for the effect of Social Policies and State-level Political Factors on the unemployed

	$\Delta\, log\,(401(k) Assets + 10)$				
	(1)	(2)	(3)	(4)	(5)
Max Benefits ($1000) × *Unemployed*	0.0889***	0.0761***	0.0715***	0.0856***	0.0709***
	(0.0220)	(0.0192)	(0.0215)	(0.0231)	(0.0199)
Unemployed	-0.185*	-0.172*	-0.147	0.258	-0.0165
	(0.0965)	(0.0989)	(0.115)	(0.291)	(0.310)
State Minimum Wage × *Unemployed*	-0.195***				
	(0.0696)				
Fraction of State House Democrat × *Unemployed*		-1.307*			
		(0.690)			
Governor is Democrat × *Unemployed*			-0.106		
			(0.147)		
AFDC/TANF × *Unemployed*				-0.000788	
				(0.000554)	
Share of Population with Medicaid × *Unemployed*					-1.240
					(2.085)
Person time-varying controls	✓	✓	✓	✓	✓
Person FE	✓	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓	✓
Worker-Year Observations	32,090	31,780	32,033	32,090	32,082
R-squared	0.288	0.286	0.287	0.287	0.287

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification F.1 for the near-retirement population (50-59 years old) with 401(k) asset growth as the dependent variable. Person time-varying controls include lagged versions of other liquid taxable assets held by the worker and those jointly held with spouse, earnings, credit card debt, store bills and rent or mortgage payments. Each specification controls for *Unemployed*, *Max Benefits* and some social policy or state-level political factor and their pairwise combinations. Standard errors are clustered at the state level.

Table F3: The Mitigating Effects of Unemployment Insurance on 401(k) Asset Decumulation by older unemployed workers (Population age 50-59 years old) Sensitivity Checks: A Potential Association between UI and the Likelihood of Job Loss

	$Job\,Loss_{it}$	
	(1)	(2)
$Max\,Benefits_{st}$ ($1000)	0.000440	-0.00193
	(0.00125)	(0.00129)
State FE	✓	✓
Year FE	✓	✓
Observations	55,245	18,372
R-squared	0.013	0.014

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification F.2 for the near-retirement population (50-59 years old). Standard errors are clustered at the state level.

Table F4: The Mitigating Effects of Unemployment Insurance on 401(k) Asset Decumulation by older unemployed workers (Population age 50-59 years old) Sensitivity Checks: Controlling for Unemployment Duration

	$\Delta log(401(k)Assets+10)$
$Max\,Benefits$ (\$1000) $\times Unemployed$	0.0653***
	(0.0231)
$Unemployed$	-0.199*
	(0.103)
$1[Unemployed] \times Weeks\ of\ Unemployment_{it}$	-0.00972*
	(0.00524)
1[Unemployed] $\times Weeks\ of\ Unemployment_{it} \times Max\,Benefit_{st}$	-0.00502**
	(0.00225)
Person time-varying controls	✓
Person FE	✓
State-Year FE	✓
Worker-Year Observations	32,090
R-squared	0.288

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification F.3 for the near-retirement population (50-59 years old) with 401(k) asset growth as the dependent variable. Person time-varying controls include lagged versions of other liquid taxable assets held by the worker and those jointly held with spouse, earnings, credit card debt, store bills and rent or mortgage payments. Standard errors are clustered at the state level.

G The Earning Loss due to Job Loss

This Appendix section documents the loss of annual earnings upon job loss for the near-retirement population aged 50-59 years old using the following specification:

$$log\,(Annual\,Earnings)_{it} = \eta_i + \zeta_{st} + \beta_1\,Job\,Loss_{it} + \epsilon_{it} \tag{G.1}$$

η_i denotes person fixed-effects. ζ_{st} denotes state-year fixed effects and ϵ_{it} is an idiosyncratic error term. $Job\,Loss_{it}$ is equal to one if worker i lost her job at year t and zero otherwise. In table G1, I report an earning decline of 30.0% at the year of the job loss holding worker's fixed effects constant. This estimate is consistent with the finding of Stephens (2001) who report an earning decline of 25%.

Table G.1: The Effect of Job Loss on Annual Earnings
(Population age 50-59 years old)

	$log\,(Annual\,Earnings)$
$Job\,Loss_{it}$	-0.300***
	(0.0255)
Person FE	✓
State-Year FE	✓
Observations	37,942
R-squared	0.822

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table reports the coefficient estimates for specification G.1 for the near-retirement population (50-59 years old). A job loss event is associated with a %30 decline in annual earnings. Standard errors are clustered at the person level.

H Optimal Social Security Claiming Strategy:

Initiating Social Security benefits entails a trade-off between the benefit amount and the duration of benefit receipt. Claiming at the Full Retirement Age (FRA), 65 for the cohorts studied in this paper, guarantees a monthly social security income equal to the worker' Primary Insurance Amount (PIA), computed based on the worker's earning history. Early claiming, relative to the FRA, enables individuals to receive benefits for a longer duration. However, early claiming is penalized by an actuarial adjustment of $\frac{5}{9}\%$ per month (or 6.67% per year of delay) for each month of difference between the FRA and the age of Social Security benefits initiation. On the other hand, delaying claiming beyond the FRA is rewarded by a Delayed Retirement Credit of $\frac{11}{24}\%$ per month of delay (or 5.5% per year of delay for cohorts born 1933-1935). There is no gain from delaying beyond age 70.

Accordingly, gains from delaying benefits claiming depends on survival expectations, patience (discount rate) and the worker's PIA. A healthier individual has an incentive to delay claiming since his / her stream of Social Security benefits is expected to last longer. A low discount rate creates an incentive for workers to delay claiming since future benefits become more valued. Similar to Coile et al. (2002), I study the case of a 62 years old worker considering the option of claiming at 62, 63, 64, 65, etc ...[38] The Expected Present Discounted Value (EPDV) of his/her stream of Social Security benefits at age 62 can be computed as follows:

$$EPDV(Claiming\,Age) = \sum_{A=62}^{MaxAge-62} \beta^{(A-62)} \times SS(A \mid Claiming\,Age) \times P(A \mid 62)$$

$Max\,Age$ is the maximum potential longevity, 119 years in this case. β is the discount rate. $SS(A \mid Claiming\,Age)$ is the total annual amount of social security benefits the worker is entitled to at age A conditional on claiming at $Claiming\,Age$. The stream of annual total Social Security entitlements, starting age 62 onwards, can be expressed as a vector conditional

[38] For simplicity, I consider claiming strategies that involve claiming on birthdays.

on the claiming age as follows:

$$SS(A \mid Claiming\ Age) = 12 \times \begin{pmatrix} 0.8\,PIA & 0.8\,PIA & 0.8\,PIA & 0.8\,PIA & 0.8\,PIA & 0.8\,PIA & ... \\ 0 & 0.867\,PIA & 0.867\,PIA & 0.867\,PIA & 0.867\,PIA & 0.867\,PIA & ... \\ 0 & 0 & 0.934\,PIA & 0.934\,PIA & 0.934\,PIA & 0.934\,PIA & ... \\ 0 & 0 & 0 & PIA & PIA & PIA & ... \\ 0 & 0 & 0 & 0 & 1.055PIA & 1.055PIA & ... \\ 0 & 0 & 0 & 0 & 0 & 1.1PIA & ... \\ ... & ... & ... & ... & ... & ... & ... \end{pmatrix} \times \begin{pmatrix} I[Claiming\ Age = 62] \\ I[Claiming\ Age = 63] \\ I[Claiming\ Age = 64 \\ I[Claiming\ Age = 65 \\ I[Claiming\ Age = 66] \\ I[Claiming\ Age = 67 \\ I[Claiming\ Age = 68] \\ ... \end{pmatrix}$$

where $I[Claiming\ Age = n]$ is an indicator function that equals one at the worker's chosen claiming age (62 or 63 or 64 etc ...) and zero otherwise. $P(A \mid 62)$ is the probability of survival till age A (By definition, the worker is assumed to be alive at age 62) and is given by:

$$P(A \mid 62) = \prod_{i=62}^{A} P(i+1 \mid i)$$

Where $P(i+1 \mid i)$ is the gender and cohort-specific conditional probability of survival till age i+1 conditional on being alive at age i obtained from the Social Security life tables for the 1930's cohort. Accordingly, the EPDV can be expressed as multiples of PIA for a given discount rate and assuming average survival expectations.[39] Similar to Coile et al. (2002) and Shoven and Slavov (2014), I use an interest rate of 3% to compute the EPDV (in multiples of PIA) of a single worker conditional on claiming at different birthdays starting 62. In the follwowing table, I quantify the Expected Present Discounted Value (EPDV) at age 62 of the stream of Social Security benefits emanating from claiming at 62 or delaying to 63 or 64 or 65.

[39] I use Social Security life tables for the 1930 cohort available at: https://www.ssa.gov/oact/NOTES/as116/as116_Tbl_7_1930.html#wp1085400

Expected Present Discounted Value (at age 62)
of the Social Security Benefit Stream
conditional on claiming at different ages (multiples of PIAs)

	Male	Female
Claiming at Age	r=3%	r=3%
62	131.66	151.21
63 (optimal for Men)	132.28	153.47
64 (optimal for Women)	131.81	154.55
65	130.23	154.39

Accordingly, for a single worker claiming on his /her earnings record, optimal claiming strategies are 63 and 64 for men and women respectively. The EPDV gains from an optimal delay are 0.62 and 3.34 PIAs (relative to claiming at the earliest age of eligibility 62) for men and women respectively.

I Clustering:

In this appendix section, I provide multiple clustering methods and report the results. I try no clustering, clustering at the person level, clustering at the state and state-by-year.

	$\Delta\, log\,(401(k)Assets + 10)$			
	(1)	(2)	(3)	(4)
$Job\,Loss_{it} \times 1[Age > 55]$	-0.512*	-0.512*	-0.512	-0.512
	(0.276)	(0.287)	(0.313)	(0.339)
$1[Age > 55]$	-0.0432	-0.0432	-0.0432	-0.0432
	(0.0858)	(0.0848)	(0.0890)	(0.0830)
$Job\,Loss_{it}$	-0.0591	-0.0591	-0.0591	-0.0591
	(0.142)	(0.142)	(0.173)	(0.147)
Clustering Level	None	Person	State $\times Year$	State
Person time-varying controls	✓	✓	✓	✓
Person FE	✓	✓	✓	✓
State-Year FE	✓	✓	✓	✓
Worker-Year Observations	32,090	32,090	32,090	32,090
Number of Workers	13371	13,371	13,371	13,371
Observations	32,090	32,090	32,090	32,090
R-squared	0.286	0.286	0.286	0.286

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1