

The Impacts of Increasing Social Security Retirement Ages: Varied Responses Across Occupations

Lindsay Jacobs*

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Abstract: With U.S. Social Security payments to retirees now exceeding the payroll taxes that fund them, reforms are imminent. Further increasing the Social Security retirement age is one possible approach among many possibilities to achieve solvency. This paper considers the effects such a policy change would have on work, claiming, disability, and welfare across people in different occupations. Using data from the Health and Retirement Study (HRS), I first show that increasing the Full Retirement Age (FRA) beyond 65 was responded to differently by blue- and white-collar workers. Next, I estimate a dynamic model of work, savings, and decisions about Social Security to measure responses under various existing and counterfactual Social Security rules. I find that increasing the Early Eligibility Age (EEA) beyond age 62 would have large labor supply and disutility effects for blue-collar workers, and results in greater disability application for this group. This is driven primarily by those in blue-collar work having more steeply declining productivity with age and less margin on which to respond to policy changes. Further increases to the FRA affects the labor supply of white-collar workers but not blue-collar, however it does increase the savings somewhat for all. Finally, I show the effects of more occupation-neutral Social Security policy designs, including reduced early claiming adjustments and crediting longer working histories. This work highlights the role of preference and state heterogeneity in both predicting responses and measuring distributional welfare effects across these policies: Compared to a model with heterogeneity, one with a representative occupation and homogeneous preferences overstates fiscal costs and understates average welfare reductions resulting from increases to Social Security retirement ages.

JEL Classifications: H23 (Externalities; Redistributive Effects) H55 (Social Security and Public Pensions), J14 (Economics of the Elderly; Economics of the Handicapped; Non-labor Market Discrimination), J26 (Retirement; Retirement Policies), J32 (Non-wage Labor Costs and Benefits; Retirement Plans; Private Pensions)

*La Follette School of Public Affairs, University of Wisconsin–Madison. I am grateful to colleagues at Wisconsin, RDRC Workshop, SOLE, APPAM, NBER SI attendees, and Matt Wiswall for helpful feedback. This work has been supported by a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement and Disability Consortium; its content represents the views of the author and does not represent the opinions or policy of the SSA or any agency of the Federal Government. Contact: lpjacobs@wisc.edu.

1. Introduction

There have been significant increases in life expectancy in the United States, and this, coupled with declines in fertility and the “pay-as-you-go” design of Social Security old-age benefits, has led to the program’s expenditures now exceeding revenues. With fewer workers taxed relative to retirees receiving benefits, reserve funds that have been making up the difference between taxes and expenditures are projected to be depleted by 2033.¹ Under current law, without reforms, the amount payable to beneficiaries would decrease by nearly 20 percent—equal to the shortfall in expected payroll taxes and benefit obligations at that time—affecting over 60 million retired and disabled workers, spouses of retired workers, and survivors of deceased workers.

To improve the solvency of the program, increases to the Full Retirement Age (FRA) for claiming old-age retirement benefits have already been implemented. Further increasing the FRA beyond 67—or even the Early Eligibility Age (EEA) of 62—is, among many reform possibilities, one conceivable way of ensuring the program’s continued solvency. The rationale is that increases in life expectancy and compression of morbidity allow for both longer working lives and many years in retirement. One concern, however, is that patterns in retirement, disability, and saving behavior differ sharply across occupations. Although not a consideration in current or proposed policy design, such differences imply that reforms to the EEA or FRA may not be neutral across occupations. This motivates the central question of this paper: what would be the effects of such policies on different groups of workers?

This paper takes a life-cycle perspective to study how labor supply decisions, health, and Social Security interact across occupations, drawing on both observed responses to past FRA increases and a dynamic model to predict responses to hypothetical future changes in the FRA and EEA. The analysis captures heterogeneity across broad occupational categories, using data from the Health and Retirement Study (HRS) and O*NET task measures to characterize labor supply, saving, and claiming behavior.

I show that responses to past FRA increases differ systematically across occupations, in ways that are not fully explained by income history or education. Increasing the FRA further leads to larger welfare reductions for blue-collar than for white-collar workers, while raising the EEA amplifies this disparity. These results align with observed differences in work and claiming patterns, with white-collar workers displaying greater ability to adjust by delaying retirement and claiming later. Interactions with Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs are especially relevant for blue-collar workers, and additional spending on these programs would partially offset OASI savings from raising retirement ages. Comparing results to a model without occupational or preference heterogeneity shows that homogeneous models overstate fiscal savings while understating welfare losses. Together, these methods provide insight into how occupation shapes responses to both past and prospective Social Security reforms.

This study contributes to three areas of literature: Social Security design and responses to reforms; occupations and work at older ages; and the welfare and distributional consequences of policy.

¹Expenditures have exceeded payroll tax and interest income since 2021, and the 2024 OASDI Trustees Report [Social Security Trustees \(2024\)](#) from the SSA Office of the Chief Actuary projects that the OASI Trust Fund will be depleted in 2033.

Responses to Public Pension Reforms and Program Interactions. The first area examines how labor supply and claiming respond to changes in the OASI claiming age structure. Many studies document significant labor supply responses to FRA increases. For example, [Mastrobuoni \(2009\)](#) showed that for the earliest U.S. cohorts exposed to FRA increases, each two-month increase in the FRA delayed labor force exit by roughly one month. Extending this analysis, [Yu \(2024\)](#) use PSID data in a lifecycle framework and conclude that FRA increases account for much of the observed rise in older-age hours worked, particularly among individuals in good health.

Work and claiming are closely linked. [Deshpande et al. \(2024\)](#) show that the peak claiming age has shifted with the FRA, despite linear benefit adjustments, while labor force exits remain “sticky” at the old FRA due to employer pension structures and workplace norms. Similarly, [Behaghel and Blau \(2012\)](#) interpret retirement behavior after FRA reforms as evidence of reference dependence and loss aversion. In Switzerland, [Lalive et al. \(2023\)](#) find sharp FRA increases with steeper early claiming penalties significantly delayed retirement, far more than actuarial adjustments alone would predict. In Italy, [Carta and De Philippis \(2024\)](#) show that reforms also raised labor supply for women well before retirement ages, suggesting that anticipation effects are substantial.

These studies mostly focus on FRA changes. Raising the EEA eliminates early claiming altogether, producing even stronger effects. For instance, [Staubli and Zweimüller \(2013\)](#) find a tight link between delayed exit and higher EEA in Austria, while [Geyer et al. \(2020\)](#) document large but heterogeneous increases in female labor supply after Germany raised the EEA, with income stability maintained through increased work or substitution into other programs. Consistent with these findings, I show that blue-collar workers are especially likely to continue claiming early and exhibit muted labor supply responses to FRA increases, while white-collar workers shift more fully toward later claiming.

An additional dimension is how tax and benefit interactions shape responses. In the U.S., the Retirement Earnings Test (RET) reduces current benefits for those working while claiming, with benefits later adjusted upward. Although actuarially fair, the RET is often perceived as a tax, distorting behavior. [Pashchenko and Porapakarm \(2024\)](#) attribute much of the peak at the FRA to the RET, while [Gustman and Steinmeier \(2005\)](#) argue that high early claiming rates can only be explained by heterogeneity in time preferences, as actuarial reductions alone would not generate observed behavior. [Bairoliya and McKiernan \(2023\)](#) further emphasize demographic heterogeneity, imperfect rule understanding, and bequest motives, showing that these frictions can explain persistently high early claiming rates. My approach complements this literature by highlighting how occupational characteristics themselves generate earlier claiming, especially for blue-collar workers.

Turning to future reforms, [van der Klaauw and Wolpin \(2008\)](#) model changes in the FRA and other aspects of Social Security, showing large differences by gender and marital status. They find that an FRA increase to 70 generates welfare losses comparable to a 50% benefit cut, but yields more revenue. [İmrohoroglu and Kitao \(2012\)](#) simulate raising the normal retirement age (NRA) from 66 to 68, finding that it boosts participation among workers in their 60s and delays claiming, closing roughly one-third of the long-run funding gap.

Finally, many studies emphasize the interaction of FRA increases with SSDI. Structural and reduced-form evidence ([Coe and Haverstick, 2010](#); [Duggan et al., 2007](#); [Li and Maestas, 2008](#); [Li, 2018](#)) shows that higher FRA leads to greater SSDI application, offsetting fiscal gains. Similar

dynamics arise in Germany (Fehr and Fröhlich, 2024) and the Netherlands (Rabaté et al., 2024). In my simulations, SSDI utilization rises disproportionately among blue-collar workers when FRA or EEA increases, consistent with evidence that manual workers retire earlier through disability pathways (Giesecke, 2018). Incorporating occupational heterogeneity clarifies both the magnitude and mechanisms of these responses, which is central for policy design.

Occupations, Pensions, and Retirement. The role of occupations and job tasks are a prominent part of this study, within a subset of retirement literature studying interactions between jobs, pensions, and retirement. Generally, compared to otherwise similar people who have worked in “white-collar” jobs, those in “blue-collar” jobs tend to retire earlier, save less, and are more likely to apply for and receive Disability Insurance (SSDI) benefits. The impact of job characteristics are found across many studies (Rutledge et al., 2017; Giesecke, 2018; Hudomiet et al., 2021) and when comparing across countries (Sauré et al., 2023), with fewer in structural models (Jacobs, 2023; Pérez, 2023). While education is often accounted for among other demographics in work on retirement and pension behavior, the clear differences across occupations remain within education categories. Occupations also motivate more natural and explicit mechanisms in modeling heterogeneity in retirement behaviors.

When faced with an increase in Social Security benefit claiming ages, a person can respond by saving more before leaving work to fund more non-work years before claiming FRA benefits, claiming early and receiving reduced benefits, and working longer. Because of differences in productivity and labor supply patterns at older ages for people in blue-collar and white-collar occupations, we should also expect the timing of Social Security claiming and the response to any policy change to differ between these groups. While Gustman and Steinmeier (2015) focus on the role of time preferences in early claiming decisions, another aspect when considering occupations as in this paper is that blue-collar workers generally face more steeply declining productivity; holding time preferences and all else constant, we will still see a difference in average claiming ages between occupations.

Because the effects of health tend to be more pronounced for those in more physical, blue-collar work, this study also draws on literature focusing on health and the capacity to work at older ages (e.g., Coile and Milligan (2017) and Cutler et al. (2013)) and French (2005) especially as a methodological basis. In the framework here, differences in earnings trajectories and participation rates with age come from occupations differing in the rates of productivity decline and work disutility increases with age whenever health declines.

Welfare Evaluation and Policy Design with Heterogeneity. A final related area considers welfare consequences of pension reforms. This paper builds on work that measures heterogeneous welfare effects of changes in claiming ages. Closest in spirit is Grossmann et al. (2024), who model occupation-specific pensions in Germany and conclude that optimal policy would provide higher replacement rates and even encourage earlier retirement for blue-collar workers, since work itself reduces health. My results, while based on U.S. data and a different methodology, reach similar conclusions about the unequal burden of retirement age increases.

Related work studies redistributive aspects of pension design. Haan and Prowse (2014) show that in Germany, raising claiming ages dominates benefit cuts in welfare terms, even accounting for differential life expectancy. Jones and Li (2023) and Bagchi (2019) emphasize the income-mortality gradient, showing that optimal U.S. Social Security formulas would be more redistributive

and impose smaller early-claiming penalties. Other studies highlight dynamic feedback: [Sánchez-Romero et al. \(2024\)](#) connect pension design to education choices, and [Daminato and Padula \(2023\)](#) show how heterogeneous welfare effects influence political feasibility. [Kolsrud et al. \(2024\)](#) use Swedish consumption data to argue that pensions should insure work longevity risk rather than merely incentivize later retirement. My findings align with this perspective, framing occupations as a central source of work longevity risk. Policies that account for occupational heterogeneity—such as benefit adjustments for long work histories or SSDI as a safety valve—would better align insurance with actual risks.

Finally, preference heterogeneity has important implications. [Lockwood and Weinzierl \(2015\)](#) show that variation in preferences for leisure versus consumption affects optimal redistribution, with higher-income groups valuing leisure more. This interacts with time preference heterogeneity emphasized by [Gustman and Steinmeier \(2005\)](#). In my model, heterogeneity in risk aversion and disutility of work, combined with occupation-specific productivity profiles, shapes claiming and labor supply behavior in ways that homogeneous models miss.

Next, Section 2 describes the HRS data sample and responses to past Social Security reforms. Section 3 outlines the model and estimation strategy. Section 4 presents counterfactual policy simulations of increased claiming ages, followed by Section 5 which discusses implications for welfare and policy design.

2. Work, Retirement, and Social Security in the HRS Data

This section introduces the Health and Retirement Study (HRS) data used in the analysis, describing respondents’ characteristics across occupations and their observed responses to past increases in the Social Security Normal Retirement Age (NRA/FRA). The evidence highlights occupations as a primary dimension along which retirement timing, OASDI program participation, and related behaviors vary. Importantly, these differences persist even after controlling for health, education, and typical income. Recognizing these occupation-specific patterns is essential for modeling retirement decisions and for evaluating how behavioral responses and welfare effects are likely to differ under potential Social Security reforms.

2.1. Blue- and White-Collar Workers in the HRS.

The primary data source here is the Health and Retirement Study (HRS). The HRS is a biennial panel data set of Americans over age 50 and their spouses, with rich information on health, savings and income, work, program participation, family, and many other factors. Its panel aspect is useful particularly for the understanding the dynamic processes of health, savings, and labor supply decisions central to the work proposed in this study. I also employ restricted-access variables on detailed occupations and Social Security earnings records to calculate expected OASI and SSDI application and benefits. The detailed occupations are then linked with O*NET data on occupational tasks to separate occupations in to more physically intense, *blue-collar*, and less physically intense, *white-collar* occupations. In particular, through linking the detailed occupational data in the HRS to O*NET, I create an indexed measure of the degree to which physical input is required for an occupation. Additional details on data and constructed categories are included in Appendix B.

TABLE 1: *Description of Male HRS Sample Respondents*

<i>Characteristics</i>		
Sample Size	4,510	
Person-Years	40,945	
Birth Years	1931–47	
Avg. Age Observed in HRS	65.5	
	Blue-Collar	White-Collar
Share in Occupation	50.6%	49.4%
Education Category		
<i>Less than HS</i>	32.2%	6.5%
<i>HS or GED</i>	47.6	24.5
<i>Some College</i>	15.6	24.8
<i>College and Above</i>	4.6	44.1
Marital Status (ages 55–59)	86.6%	87.7%
<i>Health Limitations and SSDI</i>		
	Blue-Collar	White-Collar
Difficulty ≥ 1 ADL (ages 50–54)	8.3%	3.9%
Back Problems (ages 50–54)	36.5%	28.8%
Health limits work (ages 50–54)	20.4%	10.3%
Working despite health limitation	34.7%	44.6%
SSDI Application Ever	25.1%	11.5%
Current SSDI Receipt (ages 59–62)	10.3%	4.4%

FIGURE 1: Percent in Labor Force by Age, Men in HRS Sample

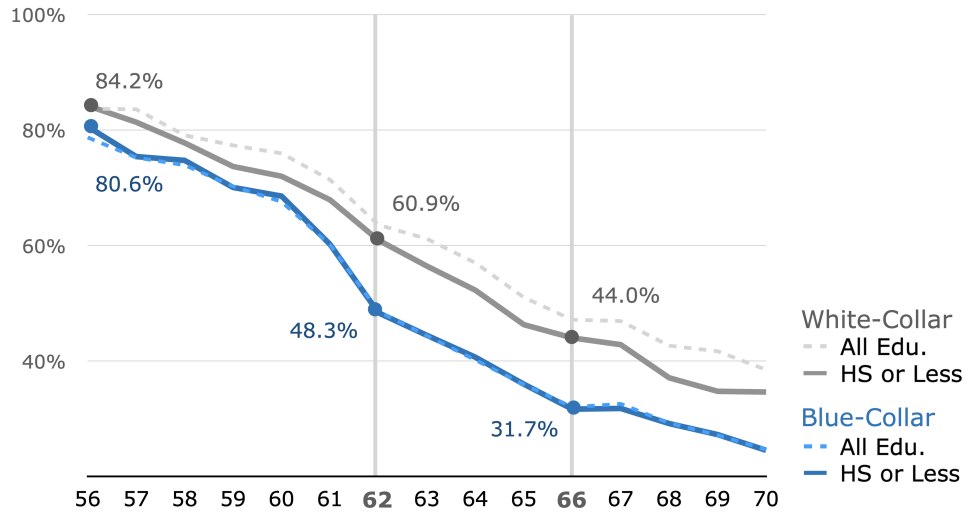


Table 1 gives a summary of some of the characteristics of men in the sample. The subset of the HRS respondents studied here includes 4,510 males born 1931–1947 who were interviewed between 1992 and 2018. Nearly all respondents are observed for more than one interview or wave of the data, resulting in 40,945 person-years, with an average age of 65.5 when surveyed. Just over half of respondents work in occupations categorized as “blue collar” based on the degree to which physical tasks are required. Notably, the education distribution differs between occupations, with more blue-collar workers being less likely to categorize themselves as having “Some College” experience or “College and Above” degrees. Because of this, in many figures that follow, I will control for or look within education groups for comparison. Importantly, though, education is not synonymous with occupation and the distributions are not distinct, particularly for these birth-year cohorts, with the the majority of blue- and white-collar workers reporting HS diploma or GED or some college. It is also worth noting that having less than a high school diploma or GED was far more common in earlier cohorts, and for these cohorts there were also a larger share of highly paid blue-collar jobs—skilled trades in manufacturing, for instance—compared to today.

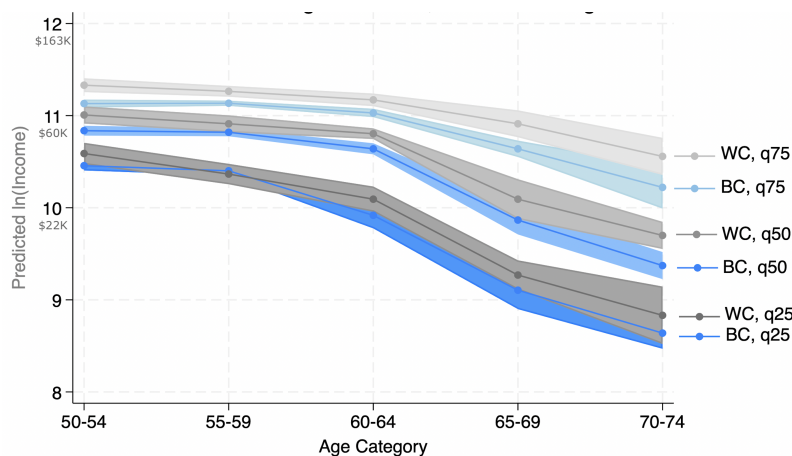
Among this sample the majority are married when first observed, and the share is similar across occupations (86.6% among blue-collar and 87.7% among white-collar workers).

The HRS interviews are conducted at times that span both working and entry into retirement given the average age at interview of 65.5. Figure 1 presents labor force behavior of the sample by broad occupation category, with one series including all respondents and education levels and another including only those who report having a high school diploma with no college. Overall, the rate of labor force participation, defined as “working for pay” at the time of the interview (as well as reporting positive earnings and working for more than five hours per week), declines greatly from age 60 on. The difference in the rates of work between those in blue-collar and white-collar jobs is significant. While some of this can be attributed to differences in the education composition between occupations, the difference in exit from the labor force with remains within an education category, seen in the high school graduates series. For all ages, the percent of those working whose career is in blue-collar work is lower at all ages, and by age 66, for instance, those in white-collar occupations are almost 40 percent more likely to be working for pay compared to those in blue-collar jobs (44.0 versus 31.7 percent).² The relevant difference in modeling and evaluating counterfactual policies is the extent to which this is driven by more steeply declining productivity in blue-collar work, as well as potentially greater disutility from working in blue-collar jobs with age or poor health.

Another aspect of the data which differs between those in different broad occupations is in limitations to work due to health as well as SSDI application and receipt. Returning to Table 1, the lower panel first shows the percent who between ages 50–54 report some difficulty with at least one instrumental activity of daily living (ADL). At 8.3 percent, this is more common for those in blue-collar work than white-collar work (3.9 percent), though not widespread. A more equal share across occupations report back problems (36.5 vs. 28.8 percent). At these same, relatively younger, ages, health translate differently into work: Blue-collar workers are about twice as likely to say that their health in some way limits work (20.4 vs. 10.3 percent) and, among them, there

²Also, though not shown in this graph, of those who are working at all, the share who report working part-time hours increases from about 5 percent at age 50 to well over half working part-time beyond age 70. Of those who are working, the proportion working part-time is roughly the same across occupations.

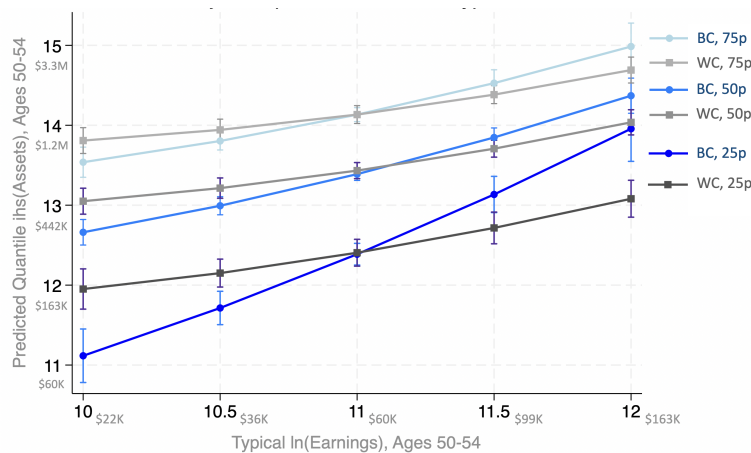
FIGURE 2: Annual Earnings by Age for High School Graduates, Adjusted



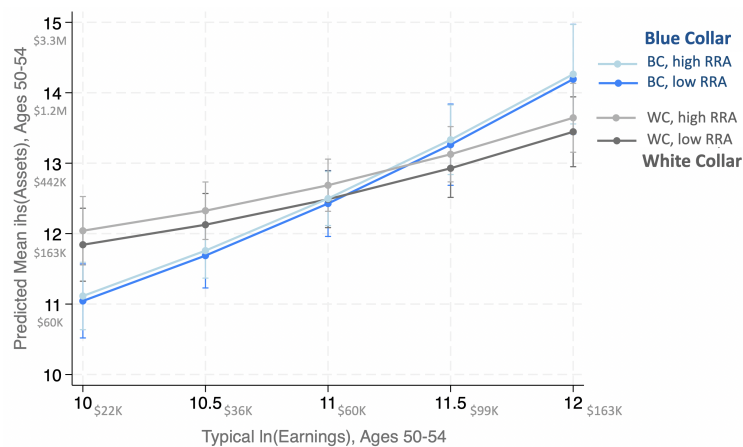
Note: Predictive margins of quantile regression, controlling for birth year, race, health, marital status, and broad U.S. Census region.

FIGURE 3: Wealth by Typical Income and Risk Aversion

(A) Predicted Wealth Quantiles



(B) Predicted Mean Wealth by Risk Aversion



Note: Outcome is inverse hyperbolic sine transformation of total wealth, including housing and defined benefit pension estimates, at ages 50–54. These figures show predictive margins of quantile and mean regressions, controlling for birth year, race, marital status, risk aversion proxy, and broad U.S. Census region. 2,188 observations.

is a larger share who are out of the labor force completely. Furthermore, these health limitations are apparently more likely to prohibit work altogether for blue-collar workers: Only 34.7 percent of that 20.4 percent of those with blue-collar work experience with a work-relevant health limitation are working and a larger 44.6 percent of the 10.3 percent of those with a white-collar background working.

The same differences in health limitations to work also translate to differences in SSDI application and receipt. About 25 percent of the sample in a blue-collar occupation have applied for SSDI compared to 11.5 percent of those in white-collar occupations. At ages 59–62, 10.3 percent of BC workers and 4.4 percent of WC workers were receiving SSDI benefits.³ While some of these differences may arise due to SSDI benefits looking relatively more attractive to blue-collar workers, who have somewhat lower earnings overall, the effect, though diminished, remains when controlling for income and education. In any case, taking into account the differences between these occupations is central to estimating how SSDI enrollment would change in response to increases in Social Security Early Eligibility or Full Retirement Ages.

Earnings at the 25th, 50th, and 75th percentiles for those observed working full-time across age categories are shown in Figure 2 for those reporting having a High School diploma but no college. The figures are adjusted for region, birth year, census region interacted with education, and health. It shows that for both occupations, without accounting for selection, observed earnings are similar and decline similarly, though arguably more for blue-collar workers.⁴

Another difference to note among those whose work is in blue- versus white-collar jobs is the difference in assets held. While adjustments for birth year, region, and education bring the levels closer, Figure 3a shows that the pattern in total assets, including housing and pension estimates, by typical income differ. Focusing on younger ages only, total assets are flatter with income for those in white-collar work, with the 25th percentile assets for blue-collar workers being much lower at lower regular incomes and slightly higher at greater incomes. Differences in assets conditional on income could be a manifestation of differences in average time preferences, levels of risk aversion, past income volatility, or other preferences across the two groups.⁵ Figure 3b shows mean assets by income by occupation and responses to a strategic survey question measuring relative risk aversion. Conditional on income, higher risk aversion for white-collar translates into more assets held, but this is not the case for blue-collar workers on average.⁶

³This does not mean that only fewer than 50 percent of the SSDI applications were successful, as those who are observed in the HRS during ages 60–64 are selected on having survived to that age, which is less likely for someone receiving SSDI.

⁴“Full-time” work includes any work beyond 30 hours per week. This declining profile in average earnings with age is typical, though there are different interpretations as to why, which, along with estimates accounting for selection into work, is discussed in wage estimation Section E.3.

⁵This notion is supported by Guvenen et al. (2019), who suggest that workers self-sort into occupations based on their risk tolerance or access to insurance through family support. Hoffmann and Malacrino (2019) shows that occupational groups exhibit different patterns of income volatility over the lifecycle. While they find that income risk is lower at lower incomes, at such levels even relatively small shocks could translate more strongly into lower levels of accumulated savings.

⁶Mean assets are below the median due to negative net assets. The distribution of assets by occupation is shown in Figure 11 in Appendix B.

2.2. Changes in Claiming Ages Following Past Reforms

We saw that blue- and white-collar workers exhibit distinct patterns in work, income, and assets, even after controlling for observable characteristics. These differences extend to the timing of Social Security OASI retirement benefit claims, with notable variation in how each group responds to increases in the Full Retirement Age (FRA). This suggests that future increases to the FRA or EEA will also elicit heterogeneous responses. Understanding both the magnitude of these differences and the mechanisms that generate them is therefore essential for developing a model that can credibly simulate counterfactual policy scenarios.

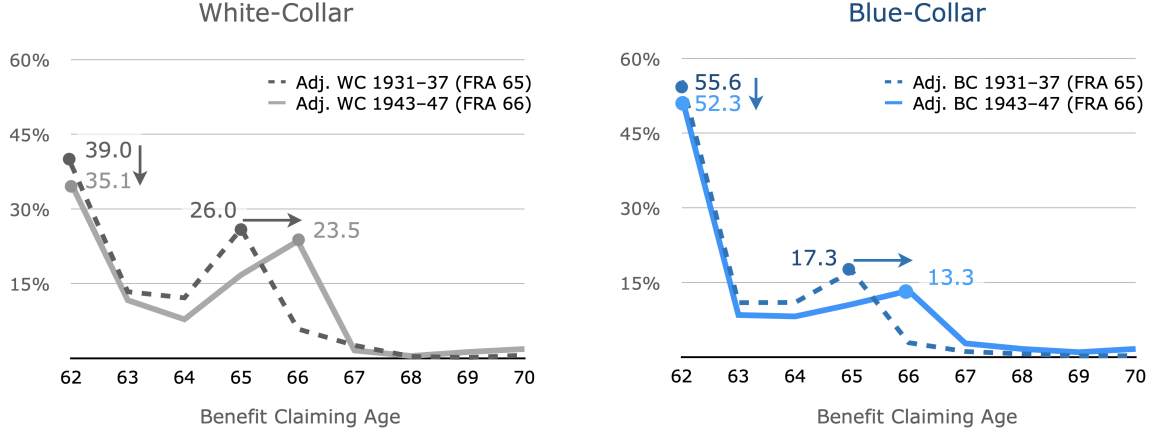
The *Early Eligibility Age* (EEA) is 62 for all birth years, while the *Normal* or *Full Retirement Age* (FRA) is exactly 65 for much of the sample (born before 1938) and between 65 and 66 for those with later birth years.⁷ Monthly benefits—the *primary insurance amount* or PIA—are determined based on earnings histories and are relative to the FRA. While a person can claim benefits as early as the EEA of 62, it is costly as monthly benefit amount is permanently lowered the earlier one claims. Claiming at the EEA of 62, there is a 20 percent reduction in benefits for those with and FRA of 65, and a 25 percent reduction for an FRA of 66. As shown in Figure 10, the formula is such that claiming later results in higher benefits, and the increase in the FRA from 65 to 66 operates as a benefit reduction conditional on claiming age up to age 68.

Early claiming is more common for those in blue-collar jobs, where as claiming at the FRA is significantly more common for white-collar workers. Figure 12 presents the OASI behavior of the sample based on their FRA by occupation, controlling for education, race, region, and history of earnings. Beyond these factors, differences in claiming ages by occupation may be for a number of reasons, including liquidity constraints, differences in risk aversion or patience levels, earnings paths and opportunities for work, disutility from work with age, and mortality expectations—all of which would have slightly different implications for counterfactual policies and with many being of primary interest here. Among white-collar workers in our HRS sample, there was a large shift in the claiming age from 65 to 66 corresponding to the increase the FRA; fewer claimed at 62 as doing so became even more costly. For blue-collar workers, however, the response to the increasing FRA was muted: There was a reduction, but many remained claiming at age 62. The peak claiming at their FRA also shifted out, but with an even smaller share claiming at the new FRA of 66. Controlling for income and other observables, those in blue-collar occupations generally remain much more likely to claim Social Security benefits at earlier ages. Notably, this excludes those who are already recipients of SSDI which those in blue-collar occupations are much more likely to receive (seen in Table 1). Estimation specifications and unadjusted claiming ages by occupation are in Appendix B.1.

Responses in labor force participation similarly were more muted for blue-collar workers. Figure 5a shows the differences in years worked ages 60–69 for cohorts facing the FRAs of 65 and 66, controlling for education, region, typical earnings, assets, and marital status. Those in white-collar jobs are more likely to work at all ages, and they increased their working years more than did blue-collar workers in response to the FRA increase. Over the ten years ages 60–69, blue-collar workers increased working years from 5.33 to 5.50, while white-collar workers went from 6.36 to

⁷Please see Appendix A for background on Social Security programs and Appendix D for more discussion of claiming ages and how benefits are calculated.

FIGURE 4: *Changes in OASI Benefit Claiming Ages by Occupation (Adjusted)*



Note: 2,310 person observations, HRS men born 1931–37 or 1943–47 who have neither received nor applied for SSDI. Adjusted figures control for early income, education, race, and region.

6.86 years on average.

Just below, in Figure 5b, we see a parallel in the differences in levels and response in SSDI application rates. For both occupations, those with higher levels of education are less likely to apply, and for all education levels, those with a blue-collar work history are far more likely to apply. With the increase in the FRA, both increased, though application rates among blue-collar workers rose even more (21.0 to 24.1 percent compared to an increase from 12.8 to 14.5 percent for white-collar workers).

3. Modeling Work, Saving, and Social Security Claiming Choices

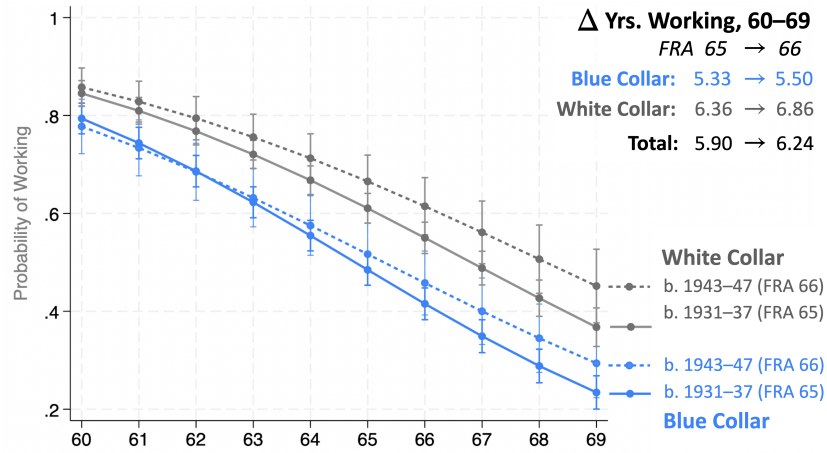
Past policy changes that increased the FRA from age 65 to 66 affected the claiming behavior of those in blue- and white-collar occupations differently in the HRS sample. To predict responses to a potential *future* policy change, I estimate a dynamic model of behavior of the mechanisms underlying the decisions observed in the HRS data under existing policies and use the model to simulate decisions under counterfactual Social Security policies. Along with studying the effects of hypothetical policies, this approach also has the benefit of gauging relative changes in welfare, which may be of interest in its own right and also in getting a sense of the political feasibility and distributional desirability of prospective policy changes.

In this model of behavior, individuals are making annual choices about work, savings, Social Security OASI claiming and DI applications and are also eligible for SSI on the basis of age, DI receipt, income, and assets. People will differ in number of ways, in both state variables or background and preferences—most notably in that they work in either blue- or white-collar occupations.

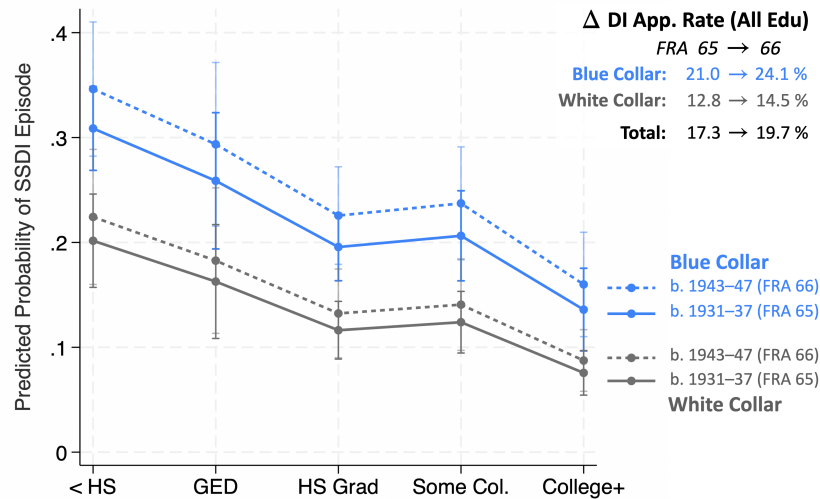
The features of the data presented in Section 2 motivate this model of decision making in later life. The structural estimation of this model involves finding the parameters of the model that generate simulated agents who most closely replicate the behavior of real people observed in the HRS data. After estimating the parameters of this model, we will use it to measure work, savings, Social Security claiming, and welfare changes under alternative policy scenarios where the

FIGURE 5: Responses to Work and SSDI Application (Adjusted)

(A) Probability of Working by Occ. and Age



(B) Probability of SSDI Episode by Edu.



EEA and FRA are increased.

3.1. The Individual’s Problem: Occupation, Labor Supply, Savings, and Social Security Application Decisions

This builds on dynamic choice models in the retirement literature and is in line with French (2005), French and Jones (2011), Gustman and Steinmeier (2015), and Jacobs (2023). It is designed to capture available decisions as realistically as possible, utilizing available data in estimation, while remaining analytically and computationally tractable. In the model, each individual arrives with a broad occupation they will remain in while working, an income history, and health status. They may differ in some preferences, making decisions annually from age 50 on about work and consumption against the backdrop of Social Security programs (OASI, SSDI, and SSI) while facing uncertainty over future income, health, and mortality.

Annual Decisions, the State Space, and Uncertainty. Every annual period at time t , individuals make decisions about:

- Current-period labor supply: Individuals choose whether to not work, work part-time, or full-time. This is a simplification based on the observation that observed hours worked tend to be clustered around 1,000 and 2,000 hours annually. Participation is notated as $p_t \in \{0, PT, FT\}$.
- Consumption that period, c_t . This is by definition also the savings decision, with $c_t \leq A_t + y_t$, where A_t represents assets and y_t income in period t . Additionally consumption must be at least as great as a consumption floor made up of outside transfers, so that $g_t \leq c_t$. The constraint of no additional borrowing is imposed to reflect the presumed difficulty in obtaining uncollateralized loans at older ages, given the uncertain stream of income and there being no possibility of garnishing an individual’s Social Security benefit payments.
- Whether to begin receiving OASI, if ages 62-70: $OASI_t^{app} \in \{0, 1\}$. OASI benefits depend on past contributions (a proportion of historical earnings), their year of birth as it determines their Full Retirement Age (FRA), and the age benefits are claimed.
- Whether to apply for SSDI if under their FRA: $DI_t^{app} \in \{0, 1\}$, which is received with some probability $p(DI_t^{rec} | DI_t^{app}, OCC_t, d_t) < 1$ that depends on occupation and functional limitation status, OCC_t and d_t , respectively (described below).

These decisions are summarized as $\mathcal{D}_t = \{p_t, c_t, OASI_t^{app}, DI_t^{app}\}$. All of these decisions are made given known current conditions—the is, the state space—for the current period t . The state variables at t are the individual’s:

- Occupation, which is categorized as either blue-collar or white-collar: $OCC_t \in \{BC, WC\}$.
- Asset level, A_t , which includes all non-housing financial assets including pension estimates.
- Past income if working, y_{t-1} (varies by whether working part- or full-time).
- Current health status. This includes both overall, self reported health, $h_t \in \{good, bad\}$, and disability, as measured by the existence of a functional limitation, $d_t \in \{0, 1\}$.
- OASI and SSDI status, which is whether they have already begun receiving in the past or not: $OASI_{t-1}^{rec} \in \{0, 1\}$ and $DI_{t-1}^{rec} \in \{0, 1\}$.

- Average Indexed Monthly Earnings, $AIME_t$, which is a function of past earnings which, along with their age relative to their FRA, determines one's OASI and SSDI benefit level.

Vector $\mathcal{S}_t = \{A_t, y_{t-1}, h_t, d_t, OASI_{t-1}^{rec}, DI_{t-1}^{rec}, AIME_t, OCC_t\}$ represents the state space at period t . Individuals make these decisions with uncertainty over a number of state variables looking forward, knowing the distribution but not the future outcome. These are:

- Future health, including overall and functional limitations (disability), h_{t+1} and d_{t+1} . Both of these are a function of current health statuses and age.
- Income if working in period t , y_t , which depends on past income y_{t-1} , current wage, occupation, health statuses, and age.
- Whether the individual will receive benefits applying for SSDI, which depends on occupation and functional limitations: $p(DI_t^{rec} | DI_t^{app}, OCC_t, d_t) < 1$.

Timing of Information and Dynamic Decisions. The individual's continuation value for decisions $\mathcal{D}_t$ at time t , given state space $\mathcal{S}_t$ is

$$V_t(\mathcal{S}_t) = \max_{\mathcal{D}_t} \left\{ u(c_t, L_t) + \beta [(1 - s_{t+1})B(A_{t+1}) + s_{t+1}EV_{t+1}(\mathcal{S}_{t+1})] \right\}, \quad (1)$$

with the future expected continuation value defined as

$$EV(\mathcal{S}_{t+1}) = \max_{\mathcal{D}_{t+1}} \int V(\mathcal{S}_{t+1}) dF(\mathcal{S}_{t+1} | \mathcal{S}_t, \mathcal{D}_t, t). \quad (2)$$

From equation (1), current period utility, which is specified below, will depend on current consumption, c_t , labor force participation, p_t , health, h_t , and whether one has applied for DI, DI_t^{app} . The future period is discounted at factor β ; with probability $s(h_t, t)$ the person survives to the next period, otherwise he leaves a bequest over which he receives utility $B(A_t)$. The individual does not know what precisely health, disability, DI receipt, wage or survival status will be in the future periods, but does know the probability distribution conditional on current health status, age, wage, and occupation. These transition probabilities are described in detail in Appendix E.

Preferences. Utility in time t is a function of consumption and leisure, exhibits constant relative risk aversion (CRRA), and is expressed as

$$u_t = u(c_t, L_t) = \frac{1}{1 - \eta} (c_t^{\alpha_c} L_t^{1 - \alpha_c})^{1 - \eta}. \quad (3)$$

The weight on consumption relative to leisure is α_c , and η (with $\eta > 0$) measures the degree of curvature of the function from which we obtain measures of risk aversion and labor supply elasticity ($= 1/\eta$). Utility is non-separable over consumption and leisure to reflect that there is reduced consumption with reduced work hours and retirement in the HRS data. The utility costs of work, receiving SSDI, and performing work while in poor health enter through the leisure component of utility. These utility parameters come through the L_t leisure variable linearly, which is measured

in hours:

$$L_t = L - N_t - \varphi_p \mathbb{1}_{p_t=1} - \varphi_{DI} \mathbb{1}_{DI_t^{app}=1} - \varphi_{BC,h^p} \mathbb{1}_{OCC=BC, h=poor, p_t=1} - \varphi_{WC,h^p} \mathbb{1}_{OCC=WC, h=poor, p_t=1} . \quad (4)$$

This component includes the total hours available, L , and number of hours worked, N_t , as well as hour-equivalent costs of working (φ_p), applying for and receiving disability insurance benefits (φ_{DI}), working in a blue-collar job while in poor health (φ_{BC,h^p}), and working in a white-collar job while in poor health (φ_{WC,h^p}). If the individual arrives at terminal time $t = T$ or does not survive to time $t < T$, which occurs with probability $1 - s(h_t, t)$, there is utility from bequest

$$B(A_t) = \frac{\alpha_B (A_t + K_0)^{(1-\eta)\alpha_c}}{1 - \eta}$$

and zero utility thereafter to age 95, with the functional form just as in [French and Jones \(2011\)](#) from [De Nardi \(2004\)](#) where α_B represents the utility weight on bequests and K_0 is described by [De Nardi et al. \(2010\)](#) as the level of wealth at which savings beyond this can be interpreted as intended for bequest rather than for precautionary purposes.

In this model, individuals may differ by type in preference parameters η (risk aversion) and φ_p (the fixed utility cost of performing work). This reflects the possible population preference heterogeneity that underlies the variety of decisions we see in the data for people who look observationally similar, as employed in [van der Klaauw and Wolpin \(2008\)](#), [French and Jones \(2011\)](#), and elsewhere. Indeed, preference heterogeneity plays an important role in matching the asset distribution, observed work, and OASI claiming behaviors.

Constraints. Consumption choice c_t must satisfy the following budget constraint, with $Y(\cdot)$ being income that includes earnings from work and transfers:

$$c_t \leq \begin{cases} [1 + r(1 - \tau)] A_t + Y(\cdot) & \text{if } A_t \geq 0 \\ Y(\cdot) & \text{if } A_t < 0 \end{cases}$$

so that the choice of c_t could allow for increased savings but not additional borrowing. Assets in $t + 1$ are

$$A_{t+1} = [1 + r(1 - \tau)] A_t + Y(w_t + g_t + OASI_{t-1}^{rec} + DI_t^{rec}, \boldsymbol{\tau}) - c_t ,$$

where r is the return on savings, and $\boldsymbol{\tau}$ captures the income tax structure. Outside transfers received, g_t , which includes Supplemental Security Income (SSI), provide a consumption floor so that $c_t \geq \underline{c} > 0$: $g_t = \max\{0, \underline{c} - (A_t + Y_t(\cdot))\}$. As shown in [French and Jones \(2011\)](#) and [Hubbard et al. \(1995\)](#), consumption floor $\underline{c}$ is important for the identification of estimated risk aversion levels.

Table 6 in Appendix C summarizes the variables included in the model.

3.2. Estimating Parameters of the Model

The preference parameters of the model are estimated in two main stages as in [Gourinchas and Parker \(2002\)](#), [French and Jones \(2011\)](#), and others. The first-stage estimates are of parameters that are not generated through the model but come from outside. These include the distributions and

transition processes for earned income, health and disability, and survival—which are estimated from HRS data—and the rate of return on assets and the discount rate, which are taken from estimated in existing literature. These parameters are then transferred into the second stage of estimation.

In the second stage, the utility parameters are estimated along with the preference type prediction parameters through Simulated Method of Moments. Through this process, the parameters that generate simulated behavior that aligns most closely, in a *generalized method of moments* sense, with behavior observed in the Health and Retirement Study data for select data moments. The moments of the data that are matched and identify the parameters of the model include: Wealth, work decisions, Social Security retirement benefit claiming and DI application all by age and occupation. The age at which people who face different full-retirement ages choose to claim retirement benefits is a prominent set of data moments to match, as the primary counterfactual policies of interest are further increases in full-retirement claiming ages.

3.3. Data Moments

The moments capture the main behavior the model seeks to explain. Below is a sketch of how the parameters are identified through matching as closely as possible the various simulated and real data moments. The parameters for this model are estimated using a total of 184 data moments, while additional moments may be used to validate the model:

- *75th/25th percentile asset ratios by age category (55–59, 60–64, 65–69, 70–75), income quintiles, and occupation.*⁸ This gives $4 \times 3 \times 2 = 24$ moments. These moments are relevant since, given the same level of permanent income, we would expect a blue-collar worker who faces on average fewer potential productive working years to save more than the white collar worker. Variation in assets held helps identify risk aversion parameters for types as well as the bequest motive at higher asset levels.
- *Proportion working part-time or full-time by age (55–59, 60, 61, 62, 63, 64, 65, 66, and 67–70), occupation, and health status.* This makes $2 \times 9 \times 2 \times 2 = 72$ moments. These moments reflect the primary labor supply decisions of interest, which should be generated by the model. This, in addition to the asset moments, helped identify η , as more risk averse types would tend to work more hours at younger ages in order to save more.
- *Percent applying for SSDI by age (55–59 and 60–64), permanent income quintile, health status, and occupation.* This gives $2 \times 3 \times 2 \times 2 = 24$ moments. These moments recover the hassle or utility cost parameter of applying for SSDI.
- *OASI claiming status by age (62, 63–64, 65–66, 67–70), occupation, and permanent income quintile, and birth-year cohort.* This gives $5 \times 2 \times 5 \times 2 = 100$ moments.

These moments are matched for each set of birth year cohorts, facing an FRA of either 65 or 66.

3.4. First- and Second-Stage Estimation

First stage health, mortality, and earnings transitions are found in Appendix E.

⁸Income here is the “permanent income” measure that corresponds to respondents’ AIME levels.

Preference Heterogeneity. The preference type prediction parameters are found in the second stage along with utility parameters. I assume that there are four preference types, with individual agents possibly differing on the coefficient of relative risk aversion η and cost of performing work (high N_t) parameters: (1) *Type 1* is less risk averse (low η) and has a lower cost of working (low N_t); (2) *Type 2* is less risk averse (low η) and has a higher cost of working (high N_t); (3) *Type 3* is more risk averse (high η) and has a lower cost of working (low N_t); and (4) *Type 4* is more risk averse (high η) and has a higher cost of working (high N_t). Though η is sometimes determined outside of the model in similar studies,⁹ I estimate this in the second stage and allow it to differ by type given that, as we will see, this parameter plays a significant role in determining the cost of health and disability risks and, consequently, the value of disability insurance. I allow for heterogeneity in N_t to account for different inclinations to work.

To predict the types, I estimate a multinomial logistic regression within the second stage, where the probability of individual i being *Type* n , $n = 1, 2, 3, 4$, is

$$\Pr(i = \textit{Type } n) = \frac{\exp(\mathbf{f}_n \mathbf{X}_i)}{1 + \sum_{k \neq n} \exp(\mathbf{f}_k \mathbf{X}_i)} \quad (5)$$

where

$$\mathbf{f}_n \mathbf{X}_i = \beta_{n,0} + \beta_{n,1}(\text{Assets at 50})_i + \beta_{n,2}(\text{Work Enjoyment})_i + \beta_{n,3}(\text{Income Gamble})_i,$$

so that the probability of having a high or low η and N_t is predicted by an HRS respondent's assets relative to permanent income at age 50, responses to a work enjoyment question, and responses to a gambling question intended to capture risk aversion (rWrisk).

Computational Procedure First, the individual agent's problem expressed in equation (1) is solved for a given set of parameters, in which the optimal savings (and equivalently consumption) is computed conditional on each labor supply choice p_t (full-time, part-time, and not working), Social Security Old-Age and Survivor's Insurance (OASI) benefit claiming choice $OASI^{app}$ (which can be claimed at age 62 or later), and Disability Insurance (DI) application DI^{app} . Next, whether to apply for DI and then whether to apply for OASI. Finally, the optimal participation choice in any period is the one that yields the greatest value given the optimal savings, DI and OASI application choice, and the realization of the preference shock $\epsilon_t(P_t)$. Next the outer maximization problem of searching across parameters to find the set which generates the behavior of simulated individuals that best matches the data is solved using the two-stage approach.

The parameters estimated in the first stage are represented by $\hat{\chi}$. Further, let θ denote the vector of parameters estimated in the second stage, which includes parameters of utility function, fixed costs of work, and type prediction. The estimator $\hat{\theta}$ is given by

$$\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \hat{\varphi}(\theta, \hat{\chi})' \Omega \hat{\varphi}(\theta, \hat{\chi}) \quad (6)$$

where $\hat{\varphi}$ denotes the vector of moment conditions described below, and Ω is a symmetric weighting

⁹For example, ? set a parameter with roughly the same interpretation as η in this paper to 1.5, while ? set the coefficient of relative of risk aversion to 3 for their exercises. Lockwood (2018) Show a range of parameter estimates across slight variations in how bequests are embedded in the model preferences.

matrix. The weighting matrix contains the inverse of the estimated variance-covariance matrix of the estimates of the sample moments along and off the diagonal.

The solution to (6) is obtained by the following procedure

1. First compute sample moments and corresponding weighting matrix Ω from the sample data.
2. From the same data, generate an initial joint distribution for wages, health, functional limitations and disability, AIME, assets, occupation type, and variables used in estimating the preference type assigned using the type prediction equation (described in Subsection 3.4). Some of the first-stage parameters contained in χ are also estimated from these data.
3. Using $\hat{\chi}$, generate matrices of random health, disability, wage, mortality, and work preference shocks for 10,000 simulated individuals.
4. Each simulated individual receives a draw from the initial distribution in Step 2, and is assigned one of the simulated sequences of shocks from Step 3.
5. Given $\hat{\chi}$ and an initial guess of parameter values contained in θ , compute the decision rules over the entire state space and generate simulated decision profiles for the decision variables.
6. Compute moment conditions by finding the distance between the simulated moments from Step 5 and true moments, solving equation (6).
7. Using an updated value of θ , evaluate the value function over the state space and compute decisions for the simulated distribution of preference types, repeating Steps 4 through 7 until the $\hat{\theta}$ that minimizes (6) is found.

3.5. Model Parameter Estimates

The results from the parameter estimation are presented in Table 2, where preference parameters shared across individuals are in the upper panel and those differing by type are in the lower panel. Here I will briefly interpret the estimates, highlighting their sensitivity to specific modeling and data choices when relevant.

Beginning with the consumption weight α_c , it is, at .49, in the range of estimated from other estimated models; this measure might look higher if the behavior of interest was of somewhat younger men. The utility cost of work that varies with age, φ_p is 15. The interpretation of this is that as one ages, assuming health and other factors are unchanged, it feels *as if* one is experiencing 15 fewer hours of leisure each year. As mentioned earlier, this is one component of the model that brings about increasing exit from the labor force with age.

The utility costs of working in poor health in either occupation, φ_{BC,h^p} and φ_{WC,h^p} , which are identified by moments of exit from work of blue- and white-collar workers by age and health status, show that working in poor health is more costly when the work is in a blue collar job (as if there is 301 fewer hours of leisure to enjoy during the year). This is one part of the model, along with wages, that generates relatively earlier retirement for those in blue-collar jobs, all else equal. These results are most sensitive to the earnings profiles, which differ by occupation.

The bequest function parameter θ_b , the estimated weight placed on bequests, is somewhat lower than expected, though this may be a result of considering only non-housing financial assets, as

TABLE 2: *Parameter Estimates*

<i>Shared Preference Parameters</i>		<i>Estimates</i>		
α_c	Consumption weight	.56		
β	Discount factor	.98		
θ_b	Bequest weight	.05		
K_0	Bequest shifter	222 (\$1,000s)		
φ_p	Utility cost of work, time trend	11		
φ_{BC,h^p}	Cost of working in poor health, BC	267 (hours)		
φ_{WC,h^p}	Cost of working in poor health, WC	185 (hours)		
φ_{DI}	Cost of applying for SSDI	240 (hours)		
<i>Type-Specific Preference Parameters*</i> (percent distribution of types)		<i>Type 1</i> (42%)	<i>Type 2</i> (39%)	<i>Type 3</i> (19%)
η	Risk aversion	4.72	3.40	5.53
N_t	Fixed cost of work (hours)	105	170	142
	Proportion in blue-collar occs.	.48	.59	.51
$1 - \alpha_c(1 - \eta)$	Coefficient of relative risk aversion	3.08	2.34	3.54

housing is a major component of realized bequests. The bequest shifter K_0 , at about \$212,000, represents the baseline level of assets for which assets beyond that can be assumed to be intentional bequests.

For the type-specific preference parameters, the individual *Types* are distributed roughly evenly across high and low levels of risk aversion, with 47 percent predicted to have lower levels of risk aversion ($\eta = 2.67$) and 53 percent higher ($\eta = 5.02$). Risk aversion η levels are in some sense higher than anticipated given that the asset measure they are identified through—non-housing financial assets—would tend to show lower risk aversion than, say, assets with housing included. However this is perhaps less surprising considering the low bequest weight θ_b ; less importance is placed on leaving bequests, so more savings is interpreted as precautionary rather than intentional bequests.

Turning to the lower panel of Table 2, we have for each occupation the percent estimated to be of each of the four Type categories.

4. Responses to Counterfactual Social Security Policies

Motivated by evidence of existing differences by occupation in the response to past Social Security FRA increases, presented in Section 2, in this section I show estimates of what various responses to potential increases to Social Security claiming ages would be. Taking the estimated preference parameters of the dynamic choice model, I simulate labor supply, Social Security OASI claiming, SSDI application rates, and savings for individual agents facing alternative Social Security policy changes and compare this to levels under current policy. The first counterfactual policy raises the Early Eligibility Age from 62 to 64, keeping the FRA as is (65 to 66 for those in the HRS data over which the model was estimated). The second set raises the FRA to age 68 and 70, keeping the EEA at age 62.

Two general findings to highlight here are that (1) increasing the Early Eligibility Age has larger

FIGURE 6: *Data and Simulated Labor Force Participation (FRA 65 and 66 Combined)*

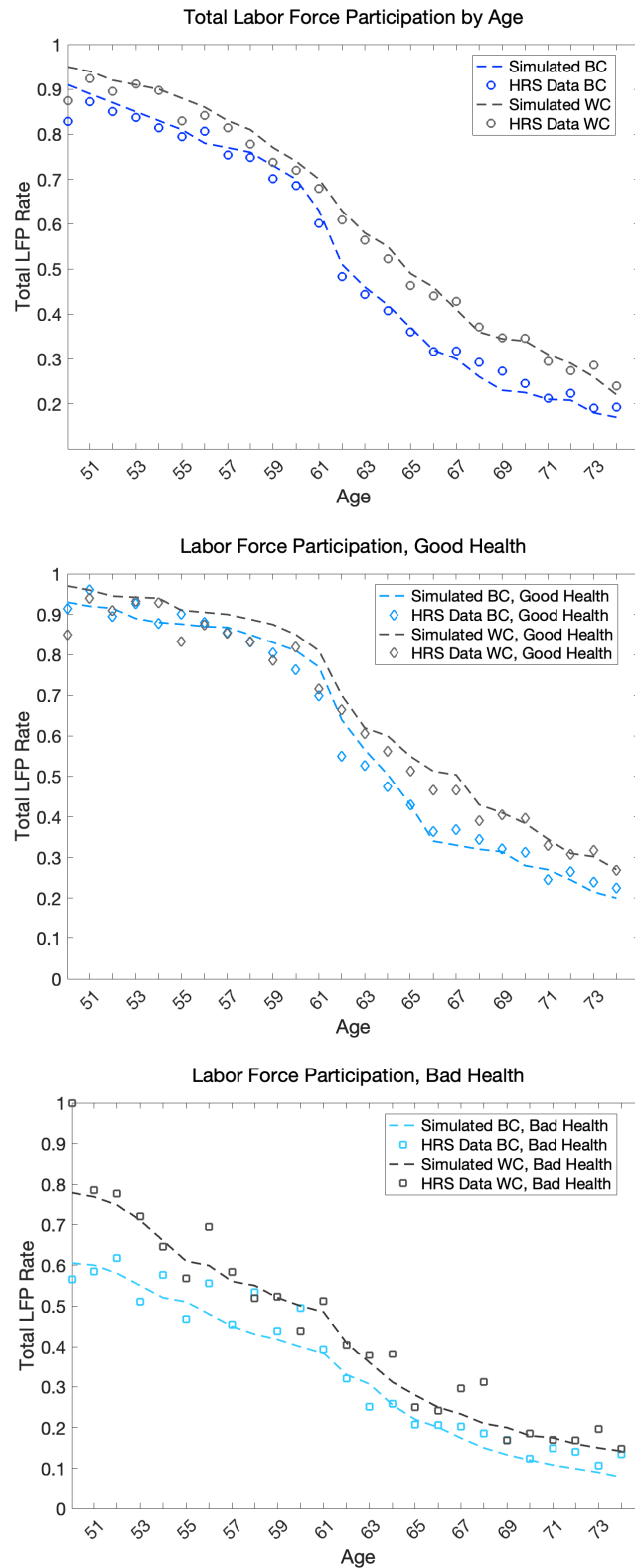
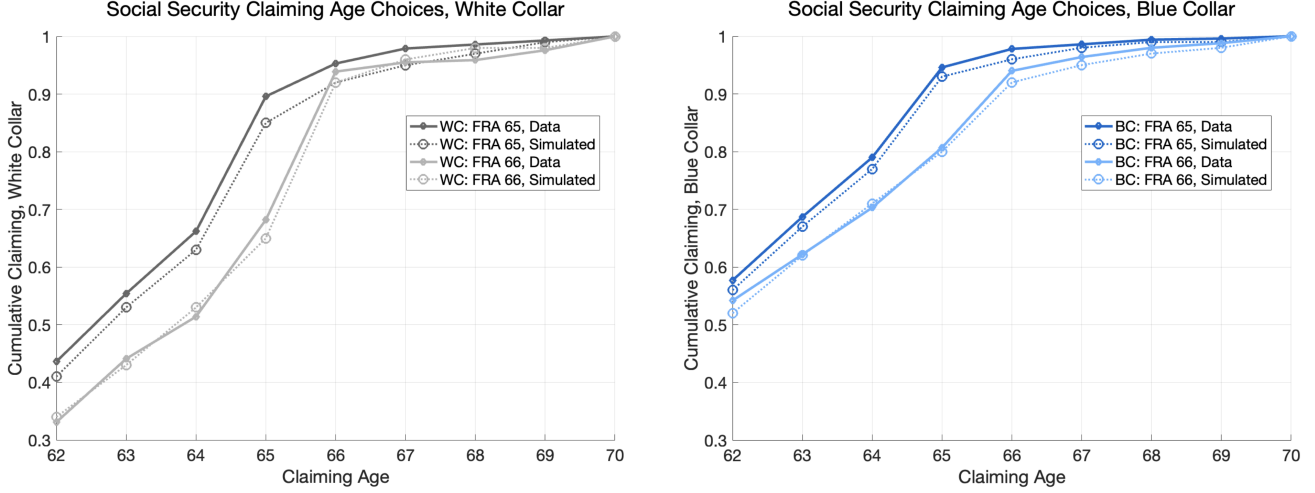


FIGURE 7: Social Security Data and Simulated Claiming Ages by Occupation



labor supply and disutility effects for blue-collar workers and results in greater DI application, and (2) increasing the Full Retirement Age affects the labor supply of white-collar workers more than for blue-collar workers, however it does increase the savings somewhat for the latter group. In Table 4, these and several other responses to counterfactual policy changes are summarized relative to the simulated moments under the policy in the model.

4.1. Increasing the Early Eligibility Age

The middle column of Table 4 shows the effect of increasing the EEA from 62 to 64 on a number of behaviors. The first is the number of years worked between the ages of 60–69. With the existing claiming age structure, those (simulated) in blue-collar occupations worked 4.07 out of those ten years and those in white-collar occupations worked over one year more on average, 5.14 years. When the EEA is raised to 64, BC workers respond primarily by working longer, 5.19 years from 60–69

TABLE 3: *Benefits Relative to FRA by Claiming Age*

	Benefits Relative to FRA under Current Policy		Benefits Relative to FRA under Counterfactual Policies			
	65 FRA (b. 1935-36)	67 FRA (b. 1960+)	68 FRA	70 FRA I (birth years... 1990+)	70 FRA II	64 EEA
62	80.0	70.0	65.0	60.0	70.0	-
63	86.7	75.0	70.8	65.0	75.0	-
64	93.3	80.0	76.7	70.0	80.0	76.7
65	100.0	86.7	82.5	75.0	83.3	82.5
66	106.0	93.3	88.3	80.0	86.7	88.3
67	112.0	100.0	94.2	85.0	90.0	94.2
68	118.0	108.0	100.0	90.0	93.3	100.0
69	124.0	116.0	109.0	95.0	96.7	109.0
70+	130.0	124.0	118.0	100.0	100.0	118.0

and save only slightly more at about \$18K versus under \$16K.

Also worth noting is the interaction between SSDI application and increased claiming ages across occupations. SSDI application for those in BC occupations goes up by almost 6 percentage points, while for WC the rate increases by under 2 percentage points. Regardless of occupation, those applying now for SSDI were disproportionately early OASI claimers under the status quo policy. This compares to [Mastrobuoni \(2009\)](#) and [Staubli and Zweimüller \(2013\)](#) who look at the increase in SSDI with the increase in the FRA in the US. The Social Security projections on the solvency effects of a similar reform indeed consider this interaction and assume that a reform increasing the EEA would result in a higher number of SSDI applicants and beneficiaries. Their estimates suggest that the increase in benefits paid due to a greater number of SSDI beneficiaries would outweigh any reduction in expenditures from increasing the EEA, *worsening* solvency overall for the combined OASDI program. The estimates here would not point to an overall increase in total OASDI expenditures; although more people would be on SSDI (and receiving the higher level of benefits they would have received if claiming at their FRA), about the same percentage of people would claim at the new EEA of 64. This is likely for two reasons: The first is that the estimates here assume that neither the costs of applying or probability of approval change alongside the increase in the EEA. If such an increase in the EEA were implemented, there might in fact be (demand for)/(simultaneously implemented) changes the application and approval process to be less costly or not require non-work for this age group. Age and occupation do currently affect DI determinations, and so the avenue already exists already. However, the second reason is that by not separating effects by occupation, the effect could be overstated. Indeed, results in a model with a uniform occupations indeed show higher increases in DI application when the EEA increases from 62 to 64 (see appendix). This is due to preferences being convex over work; when occupations are distinct, overall, those particularly in WC occupations are more able to “absorb” the increase in the EEA, which offsets the degree to which those in BC occupations are not.

Finally, welfare loss resulting from increasing the EEA is lower for those in WC occupations, who experience a welfare loss of 2.1 percent compared to 5.7 percent for those in BC occupations. This is presumably because WC workers can adjust along the lines of labor supply in a less costly way. In summary, raising the EEA seems to be especially costly for the typical blue-collar worker. This is driven primarily by the fact that those in blue-collar work have more steeply declining productivity with age and are also more likely to be the lower η preference type, which wants to hold fewer assets giving less margin on which to respond to policy changes.¹⁰

4.2. Increasing the Full Retirement Age

The rightmost column of Table 4 shows behavior when the FRA is raised to age 68. Comparing to labor supply changes when the EEA is raised, the effects for BC workers are quite minimal, and a smaller than the effects for WC workers; the number of years worked while aged 60–69 goes up by only .08 years for BC workers compared to nearly .7 years for WC workers.

Increasing the FRA has the effect for both occupations of decreasing the percent who claim OASI benefits at the EEA, and more so for WC workers than for BC workers. The effect, however, is very

¹⁰All counterfactual responses are sensitive to the fact that simulated individual agents are behaving as if they were aware of the counterfactual policy at age 50. This would overstate welfare loss if in fact the policy were known perfectly at an earlier age as individuals would have more potential periods over which to adjust.

small compared to the large *increase* due to raising the EEA. For workers in both occupations, the rate of SSDI application goes up—by 4.6 percentage points for BC workers and by 3.6 percentage points for WC workers, which is a relatively higher increase for the latter.

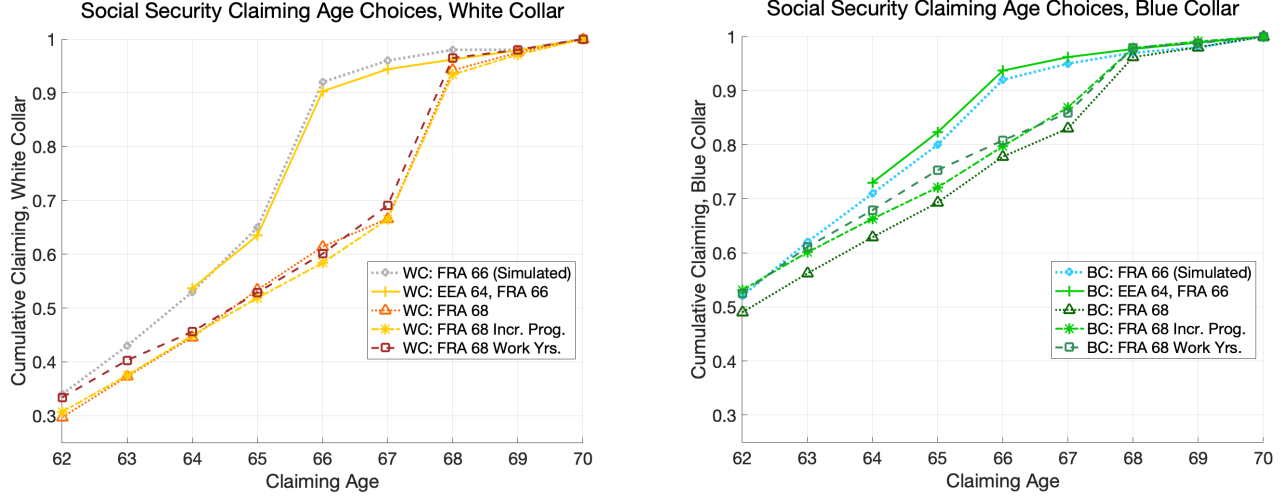
Generally, for all behaviors, raising the EEA induces more of a response from BC workers, while raising the FRA has a relatively greater response for WC workers. The increase in SSDI applications, however, shows an exception. The increase in the SSDI application rate among white-collar workers when the FRA goes up to 68 is greater (from 11.3 to 14.9 percent) and than when the EEA increases (from 11.3 to 12.8 percent). This is likely due to the variation within white-collar workers being such that the least risk-averse types within white-collar workers are most responsive.

TABLE 4: *Summary of Counterfactual Policy Effects*

		<i>Outcomes Under Alternative Policies</i>			
		Claiming at EEA (%)	Years Worked, 60–69	SSDI Ap- plicant (%)	Δ Welfare*
Status Quo Policy of FRA 66					
	Blue-Collar	56.5	5.51	24.2	-
	White-Collar	38.7	6.81	14.1	-
	All	47.1	6.25	19.5	-
Raising EEA to 64					
	Blue-Collar	77.4	6.02	27.9	-19.2
	White-Collar	45.5	6.90	15.7	-6.5
	All	62.4	6.48	22.0	-12.9
	<i>Model Without Occupations (All)</i>	56.6	6.75	19.1	-7.9
Raising FRA to 68					
	Blue-Collar	52.8	5.70	25.1	-7.4
	White-Collar	31.2	7.18	14.6	-4.2
	All	43.0	6.52	19.8	-5.9
	<i>Model Without Occupations (All)</i>	39.9	6.76	17.4	-4.5
Increased Progressivity of Benefit Formula with FRA 68					
	Blue-Collar	53.1	5.49	24.8	-7.1
	White-Collar	32.7	6.95	14.3	-4.1
	All	44.0	6.30	19.6	-5.6
	<i>Model Without Occupations (All)</i>	41.1	6.63	17.2	-4.2
Crediting Longer Years Worked					
	Blue-Collar	52.5	5.56	24.8	-6.8
	White-Collar	33.4	6.89	14.2	-4.0
	All	43.1	6.23	19.5	-5.4
	<i>Model Without Occupations (All)</i>	41.0	6.58	17.1	-4.2

*Changes in welfare are relative to the FRA 66 policy, and are compensating variation (CV) measures are in total remaining welfare, calculated as a percent of assets for age 50 on for a person with median characteristics.

FIGURE 8: Social Security Claiming Ages Under Counterfactual Policies



4.3. Changing Progressivity with an Increase in the FRA

The rationale for this alternative follows findings from [Jones and Li \(2023\)](#). They show that, given the income-mortality gradient, the optimal policy would have flatter claiming age adjustments relative to both existing and actuarially fair adjustments. In the case of occupations, there is a relationship between an occupation's work-life expectancy, disutility and productivity with age. All else equal, blue-collar workers claim earlier, and with benefits reduced. To what extent would a more progressive formula diminish the difference in welfare based only on occupation?

This counterfactual policy increases the progressivity of benefits as a function of earnings history, depicted in Figure 14 in Appendix D.

4.4. A More Occupation-Neutral Benefit Formula

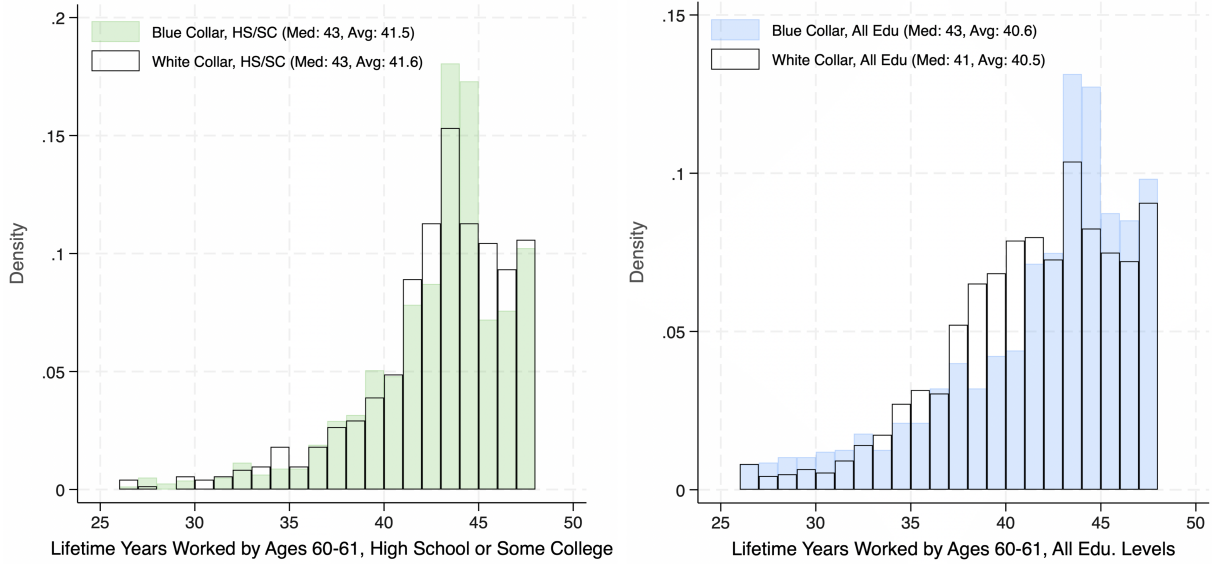
This counterfactual policy credits workers with longer work histories. The effects of a similar policy change in Germany are measured by [Dolls and Krolage \(2023\)](#). Indeed, [Grossmann et al. \(2024\)](#) posit this as a more feasible way of implementing a policy aimed at equalizing pension fairness across occupations. Under current policy, the benefit formula is a function of the 35 highest earning years. However, on average, those with a lower number of years of formal education enter work earlier and have longer work histories; while not aligned precisely with occupation, they are also more likely to work in physically-intense, blue-collar jobs. For example, someone who begins work at age 18 might have up to 44 years of full-time work, while if the same person beginning work at age 22 would have only 40 years of work *and taxed earnings*. In some ways, the progressive structure of the formula might compensate in practice, but only because of the differences in average levels (and not years worked).

This counterfactual policy reflects proposed reforms that would extend the number of years in AIME calculations from the 35 highest-earning years to 40. To estimate past earnings history, I use current earnings as well as the HRS question of total number of years worked to obtain the

trajectory of earnings as in [Jacobs et al. \(2022\)](#). From this, I calculate the benefits under both current policy and counterfactuals.

Overall, I find that this has very little effect on closing the gap between those in different occupations. For instance, under current policy, OASI EEA claiming and SSDI application rates are unchanged for blue-collar workers but increase by about 1 percentage point for white-collar workers. This could be due in part to the additional years of earnings in the benefit calculation being lower for all groups, but bringing down the average of those in white collar work more.

FIGURE 9: *Reported years worked for Ages 60–61, Differences by Occupation and Education*



4.5. Comparing Changes in Welfare Under Alternative Policies

The last column in Table 4 shows the changes in welfare for alternative policies relative to status quo Policy O where the FRA is 66. Compensating variation $CV_{O \rightarrow A}^{occ}$ is given as percentage of consumption from age 50 that would make someone in occupation occ as well off under alternative Policy A as they were under Policy O .

Table 4 shows, the bottom row under each alternative policy, responses to policies in a re-estimated model that does not account for occupational heterogeneity. Relative to the average response for blue-and white-collar workers in the model with occupations, nearly all responses are understated—including welfare changes. Under a counterfactual policy the increases the EEA to age 64, years worked increase by 0.5 years in the model without occupations, compared to less than half as much in the model with occupations. Generally, the model without occupations understates how costly it is for some—primarily blue-collar workers—to delay exit from work.

5. Discussion

This work has shown that there are substantial differences in labor force and Social Security decisions for otherwise similar people working in different occupations. Accounting for preferences and state heterogeneity in the form of occupations has meaningful effects on both welfare estimates and predictions of responses to policy changes.

The counterfactual exercises illustrate that distributional differences persist under alternative policy designs. Raising the EEA produces especially large welfare losses for blue-collar workers, while increasing the FRA disproportionately affects white-collar workers. Adjustments to progressivity or benefit crediting for longer work histories reduce, but do not eliminate, these disparities. This underscores that apparently “occupation-neutral” reforms have hidden distributional consequences once heterogeneity in health, productivity, and work capacity is accounted for.

The role of individual heterogeneity in shaping aggregate responses has been recognized in related literatures on demand estimation and optimal taxation (Cosaert and Demuyne, 2018; Lockwood and Weinzierl, 2015; Jacquet and Lehmann, 2020). The difference between estimates with and without heterogeneity depends on (1) whether it enters linearly and (2) whether heterogeneity in non-linear preference components—for instance, the relative weight on consumption versus leisure—is correlated with income or other state variables. Ignoring such correlations risks systematically understating both distributional differences and welfare consequences.

The findings here matter for both welfare evaluation and projections of behavioral responses. Incorporating even basic heterogeneity in occupations and risk aversion substantially changes estimates of the effects of increasing the EEA and FRA. In particular, models that assume homogeneous workers show *smaller* responses in work, savings, and welfare relative to models that incorporate differences across blue- and white-collar occupations. This difference is not trivial: distributional incidence is central to how reforms are experienced by the population, and omitting it biases projections toward more favorable aggregate outcomes.

Preference heterogeneity also shapes predictions of fiscal impact. Social Security Administration projections suggest that reforms such as FRA and EEA increases would improve solvency to varying degrees.¹¹ My estimates complement these projections by showing how work, savings, and claiming decisions shift in response to reforms, and by highlighting potential offsets. For example, my results suggest that fiscal gains from raising the EEA would *not* be offset by increased SSDI participation, in contrast to some prior expectations. Still, the occupationally concentrated rise in SSDI applications underscores the need to consider program interactions when evaluating reforms.

Beyond immediate solvency considerations, these findings highlight several broader implications. First, they point to a need for greater integration of disability and retirement policy: blue-collar workers face steeper productivity declines and are more likely to rely on SSDI when retirement ages rise, suggesting that SSDI functions as a de facto equalizer. Second, the results connect to debates over fairness in pension design. Echoing findings in Germany and other countries, the U.S. system as currently structured provides longevity insurance but does not explicitly insure against the “work longevity risk” faced by those in more physically demanding jobs. Policies that credit longer work histories or smooth early claiming penalties represent one approach to better aligning

¹¹See the Social Security Administration’s Office of the Chief Actuary projections at <https://www.ssa.gov/oact/solvency/provisions/index.html>.

benefits with underlying risks.

Third, this work speaks to the political feasibility of Social Security reform. Distributional welfare effects are large enough that policies may be contested not only on aggregate solvency grounds but also on their perceived fairness across occupations and income groups. By showing how blue-collar workers experience disproportionately larger welfare losses, the analysis adds to a growing literature on the political economy of pension reform (e.g., [Daminato and Padula, 2023](#)).

Methodologically, this paper contributes by integrating occupation-specific heterogeneity into a dynamic structural model of retirement, savings, and claiming. The model highlights how relatively parsimonious differences in productivity decline and work disutility by occupation can replicate key patterns in the HRS data, including differential responses to past FRA increases. Incorporating heterogeneity in preferences further improves the match to observed assets and claiming ages. These features not only strengthen the credibility of counterfactual predictions but also provide a template for evaluating future reforms under realistic assumptions about heterogeneity.

As the nature of work changes and the size of the older population continues to grow, understanding the links between occupations, health, and Social Security will become increasingly important. Past increases in the FRA produced distinct responses across occupations, confirming that further increases in the FRA or EEA will generate large distributional consequences. The results here highlight that these consequences extend beyond claiming to work, savings, and welfare, and that they fall most heavily on workers in more physically demanding occupations. Incorporating heterogeneity into both empirical analyses and policy simulations is therefore not only methodologically desirable but essential for designing reforms that are sustainable, equitable, and politically viable.

Appendices

A. Background on Social Security, Past Reforms, and Related Programs

A.1. Social Security Retirement Benefits

Social Security retirement benefits are administered by the Social Security Administration, and are the “old-age” component of the larger Old-Age, Survivor’s, and Disability Insurance (OASDI) program. They began as part of the Social Security Act to reduce poverty among senior citizens, with the first payouts for retirement benefits coming in 1938. Currently, nearly all workers—over 90 percent—are in “covered” employment and pay payroll taxes and can expect to receive retirement old age benefits upon claiming. These benefits can be claimed between the ages of 62 and 70 and the amount that one receives is dependent on this claiming age, their birth year and full retirement age for their birth year, and their taxed earnings history. The normal or Full Retirement Age (FRA) depends on one’s birth year; it varies between 65 (for those born before 1938) and 67 (for anyone born 1960 or after). The later a person claims these benefits, the more that they will receive up until their death.¹² The average monthly benefit amount in 2025 for a retired worker is about \$2,000, and the number of recipients—including workers and spouses—is about 53 million.¹³

The payroll tax that finances OASDI comes as a 12.4 percent tax on earnings below some threshold for most classes of employees, with half paid by the employer and the other half by the employee. While there is not a separate financial account tied to each worker, the worker’s earnings history, adjusted for growth in wages—the Average Indexed Monthly Earnings or AIME—will determine the amount paid out at various claiming ages, with the Primary Insurance Amount (PIA) the monthly benefit a worker receives at his or her FRA. The benefit formula is progressive in the sense that higher earnings do result in higher benefits, but increases in benefits are not proportionate to the amount taxed or earned.

While the Social Security benefit structure does not determine work decisions, it does influence labor force participation at older ages. This, as well as the question of how people decide when to claim Social Security benefits is the subject of numerous studies. Slavov (2023) gives an overview and documents changes in Social Security claiming behavior over two decades, considering factors such as delayed retirement credits, mortality improvements, and interest rates, and discusses the impact on optimal claiming decisions. Kopczuk and Song (2008) shows how Social Security benefit claiming has responded to changes in benefit taxation.

The Social Security benefit structure influences work decisions primarily through (1) the delay of benefit taxation while working and claiming and (2) increased benefits with delaying claiming. In other national pension systems the disincentive to work and claim is stronger, and to claim benefits almost necessarily implies stopping paid work. Kuitto and Helmdag (2021) shows how macro-level institutional factors shape retirement and labor market participation among older workers across OECD countries. This is in contrast to studies of responses to Social Security changes in the U.S,

¹²For a married person, he or she can claim retirement benefits based off of their own earnings history or, if it is higher, up to half their spouse’s benefit level. In the event of an insured worker’s death, their spouse would receive survivors benefits that are at least 71.5 percent of what their spouse’s benefits would be if the spouse had claimed at their full retirement age.

¹³<https://www.ssa.gov/oact/STATS/OAbenies.html>

where responses in work are less pronounced.¹⁴

A.1.1. Disability Insurance

Social Security Disability Insurance (SSDI) provides benefits in the event that someone becomes significantly and permanently limited in performing paid work. It is administratively linked to old-age retirement benefits as part of OASDI program, and retirement benefits and Disability Insurance also share a common Primary Insurance Amount (PIA) formula based on past earnings history. Unlike retirement benefits, where approval is automatic upon verification of age and past contributions, SSDI approval is not guaranteed and is part of a longer determination process. The amount of retirement benefits received is also determined by claiming age (where approval is certain), where the amount is lower the earlier one claims. The SSDI benefits that awardees receive, on the other hand, are equal to benefits one would receive if claiming at his or her full retirement age. There are currently about 8.5 million recipients and dependents.¹⁵

Increases to the full retirement age (FRA) for old-age retirement benefits also change the relative value of prospective SSDI benefits, which is an aspect I consider in this paper. Many researchers have studied how increases in the FRA and retirement benefit generosity interact with enrollment in the SSDI program, including [Duggan et al. \(2007\)](#), [Li \(2018\)](#), and [Coe and Haverstick \(2010\)](#). To illustrate how this interaction operates, it is helpful to consider an example: Imagine a person whose earnings history corresponds to a PIA—what she would receive at her Full Retirement Age (FRA)—of \$2,000. If she were to become disabled at age 61 and is approved for SSDI, she would receive the full \$2,000 monthly benefit starting at age 61. However, SSDI approval is uncertain, and the process can be lengthy, requiring the applicant to demonstrate they have not engaged in substantial paid work during the application process. This uncertainty may lead her to compare the risks of applying for SSDI with the more predictable option of claiming early retirement benefits, even at a reduced rate. If she faces an FRA of 65, she could claim early retirement benefits at age 62, receiving 80 percent of her PIA, or \$1,600 per month. This permanent monthly \$400 reduction may be preferred to the risks associated with applying for SSDI, even if the potential benefit of \$2,000 if awarded is higher. On the other hand, if her birth year is such that her FRA is 67, she would receive only 70 percent of her PIA by claiming retirement benefits at 62, or \$1,400. With this larger permanent reduction of \$600, she might choose to take the risk of not working, applying for SSDI, and possibly receiving \$2,000 per month if awarded. So as the FRA increases, SSDI becomes relatively more valuable, even if uncertain.

This is particularly relevant for individuals in more physically demanding jobs, where the ability to continue working often declines more quickly with age, an aspect of this interaction that I study here. For the person in a more physically demanding job, the option of continuing work in some capacity is further limited, and the value of SSDI is that much greater with increases in the FRA.

[Li \(2018\)](#) explores whether the rise in the FRA under Social Security influences older workers' decisions to apply for disability benefits. Using data from the Health and Retirement Study (HRS), the study sheds light on the behavioral responses of individuals to changes in retirement incentives, providing insights for the design of social insurance programs aimed at promoting labor force

¹⁴For example, [Dolls and Krolage \(2023\)](#), [Rabaté et al. \(2024\)](#), and [Lalive et al. \(2023\)](#) all show significant employment effects and employer influences across Europe.

¹⁵<https://www.ssa.gov/oact/STATS/DIBenies.html>

participation among older workers.

A.1.2. Supplemental Security Income

The Supplemental Security Income (SSI) program is a federal income assistance program under Title XVI of the Social Security Act, intended to provide a safety net for elderly, blind, or disabled individuals who have limited income and assets. Recipients must satisfy certain eligibility rules:

- Their income (from work, Social Security benefits, etc.) must fall below specified thresholds. Excess income is deducted dollar-for-dollar from the federal benefit.
- Their countable resources must be below statutory limits (\$2,000 for an individual, \$3,000 for a couple, with certain exclusions).
- For those under age 65, SSI eligibility requires qualification on the grounds of disability or blindness (equivalent to Social Security disability criteria).
- In many states, receiving SSI also qualifies the individual for Medicaid.
- Importantly, SSI is funded from *general federal revenues*, not from payroll taxes or a dedicated trust fund.

A nontrivial share of SSI recipients also receive Social Security benefits. According to recent SSA data, about 34% of SSI recipients also receive OASI or SSDI benefits. In December 2023, approximately 7.4 million individuals received federally administered monthly SSI payments, averaging about \$675 per person. Since Social Security benefits count as income (or partial income) when determining SSI eligibility or benefit levels, reductions in OASI benefits (for instance from raising the EEA or FRA) can increase SSI eligibility or raise payments via the “topped-up” subsidy effect. That is, a lower OASI benefit could push someone below the income threshold and make them eligible for SSI or increase their SSI top-up.

Because of SSI’s income floor structure, reforms that reduce OASI benefits or delay claiming could raise demand for SSI among lower-income retirees, especially those with limited assets or in physically demanding occupations. In effect, some of the fiscal savings from OASI cuts would be offset by increased SSI outlays.

[Primus et al. \(2024\)](#) propose increasing the SSI program’s generosity—raising asset exclusions and relaxing income limits—as an alternative or complement to more progressive OASI reforms. They argue that a more generous SSI better aligns with the principle of insuring retirement risks, particularly for those with low lifetime earnings, and that the current rule (100% recovery rate on OASI income) “contradicts the concept of earned-income principle” by fully offsetting OASI in the SSI calculation.

A reform that increases the Early Eligibility Age (EEA) or Full Retirement Age (FRA) would likely shift more low-income retirees into SSI safety net status. Because SSI is better targeted to those with low earnings histories, the incidence of this “spillover” will likely be concentrated among workers with lower assets, or in occupations with steeper declines in productivity who tend to claim benefits earlier.

In modeling counterfactual reforms, incorporating SSI explicitly is valuable for two reasons: (1) It captures the bottom tail of the welfare distribution: for low-wealth retirees, the option of SSI

buffers welfare losses from reduced OASI benefits or delayed claiming. (2) It provides a budget-offset channel: increased SSI spending partially offsets OASI savings, which is especially relevant in evaluating net fiscal effects.

A.2. Reforms Increasing the Full Retirement Age

There have been several amendments to Social Security in the decades following its inception, with the most recent being in 1983. Changes were aimed primarily at addressing near- and long-term solvency and included adjustments to payroll and benefit taxes, coverage, and, central to this paper, the increase in the full retirement age. Social Security is “self-funded” and benefits are financed legally by revenue from payroll taxes only. At the time of these reforms, Social Security was within a year of insolvency, obligated benefits to retirees would exceed the contemporaneous payroll taxes of workers. The deficit would only grow due to demographic changes of reduced fertility, leading to fewer workers relative to retired beneficiaries, who have increased average life expectancy. The reforms made the program immediately solvent, and excess revenues even ensured a growing Social Security Trust Fund to cover future deficits for some time. Indeed, since 2021, benefits paid out have exceeded payroll tax revenues, and this difference has been covered by Trust Fund reserves. These funds are projected to be depleted by 2034 [Social Security Trustees \(2024\)](#), making future reforms imminent.

The 1983 reforms increased the Full Retirement Age (FRA) from 65 to 67 gradually, and depending on birth year, for all workers born in 1938 or later.¹⁶ While one can still claim benefits as early as age 62, an increase in the FRA changes the age at which unreduced benefits relative to one’s PIA can be claimed. While increases in the FRA are equivalent to benefit cuts along all claiming ages, the FRA appears to remain a powerful reference point in claiming decisions. [Deshpande et al. \(2024\)](#) show that peak claiming tracks increases in the FRA, despite the adjustments relative to the FRA remaining linear; work decisions, however, are “sticky” at the old FRA due to employer pension effects and workplace norms. [Behaghel and Blau \(2012\)](#) study framing effects in retirement behavior following changes in the full retirement age, revealing evidence of reference dependence with loss aversion. Others emphasizing reference points, with coupling of work choices being stronger outside US.

[Siebold \(2021\)](#) similarly shows the role of statutory retirement ages as reference points for retirement behavior and how pension reforms affecting these ages influences retirement decisions. [Mastrobuoni \(2009\)](#) identifies the effects of increases in the Full Retirement Age (FRA) as part of the 1983 reforms.

B. HRS Data and Occupation Classification

The sample presented here includes only males has two related rationales. The first is that, when estimating a model of behavior, the more similar the individuals are in preferences, the more precisely the model can be estimated. The men and women, especially of the birth-year

¹⁶Specifically, the reforms increased the FRA for workers born after 1937 and before 1943 by 2 months for each year born beyond 1937, so that those born in 1938 faced an FRA of 65 and 2 months, those born in 1939 have an FRA of 65 and 4 months, etc. For those born 1943–54, the FRA is 66. For birth years 1955–1959, the FRA again increases by 2 months for every year past 1954. Anyone born in 1960 or later faces an FRA of 67.

FIGURE 10: Adjustment in Social Security Benefits Relative to PIA by Claiming Age

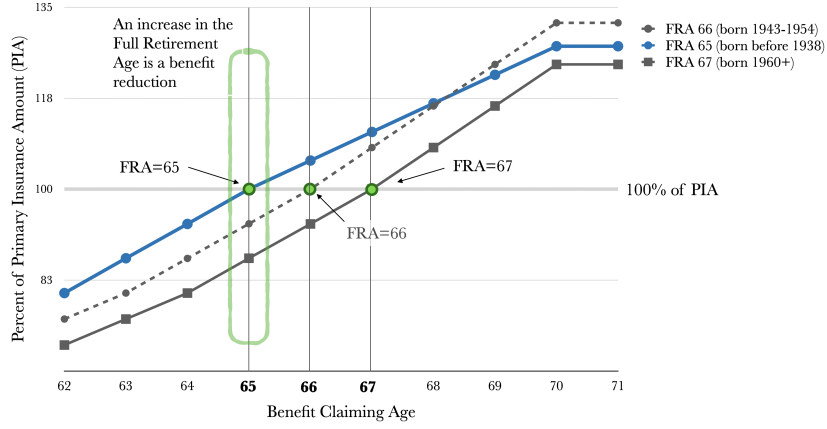


TABLE 5: *SS claiming by subjective life expectancy and occupation*

	<i>When claimed SS benefits</i>		
	By age 62	63-64	65 and Older
<i>Physical Intensity of Work</i>			
White-Collar	48.4	17.2	34.4
Blue-Collar	59.0	18.6	22.4
<i>Prob. of Living Past 75</i>			
0 to 39 percent	73.7	12.9	13.4
40 to 60 percent	64.9	16.2	18.9
61 to 100 percent	58.9	16.0	25.1

Note: Includes 2,390 observations.

cohorts analyzed here, have very different labor supply patterns suggests that their preferences might differ enough to justify separate models of decision making or joint household decisions with bargaining, for instance (e.g., Cassanova 2014). A related reason is that a large enough portion of married males have spouses who are not working when first observed in the HRS data, making the male respondent's decisions reflect the outcome of a joint household decision. Of those who are married, 54.3% have a spouse working FT when first observed (and are excluded from the parameter estimation).

B.1. Additional Descriptive Data from the HRS

The sample shows relationship between subjective LE and claiming, but greatly diminished when controlling for occupation and income. [Beauchamp and Wagner \(2020\)](#) show this relationship with (unadjusted) LE and claiming, with an adverse selection framework.

FIGURE 11: *Distributions of Total Assets by Occupation and Education, Ages 50–54*

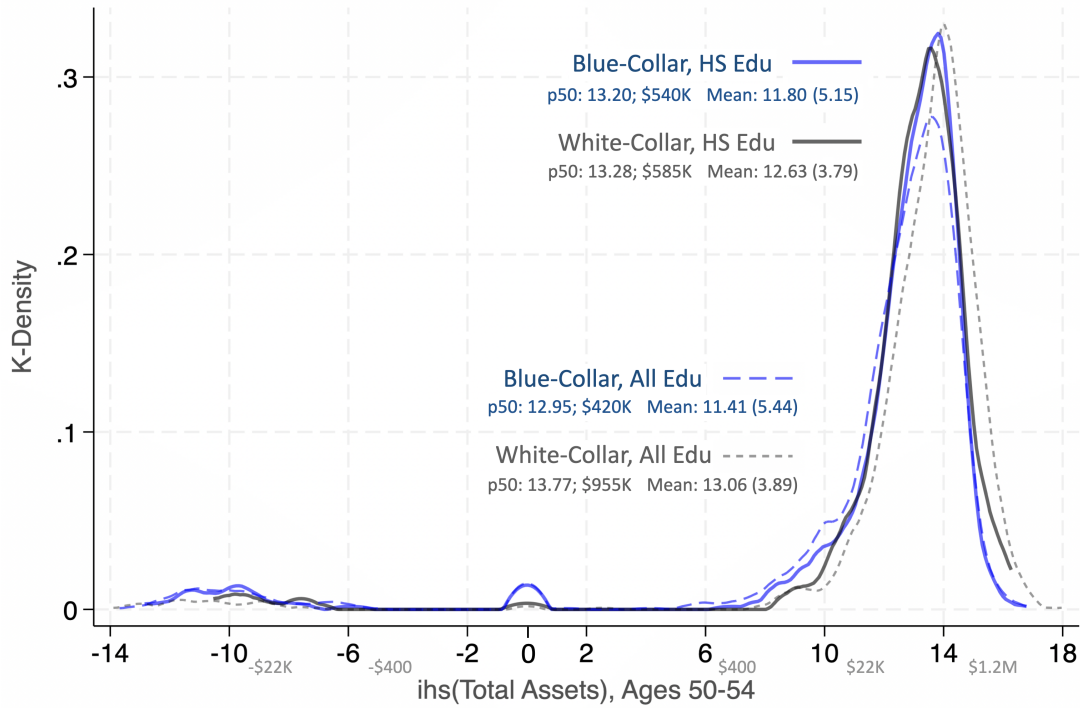
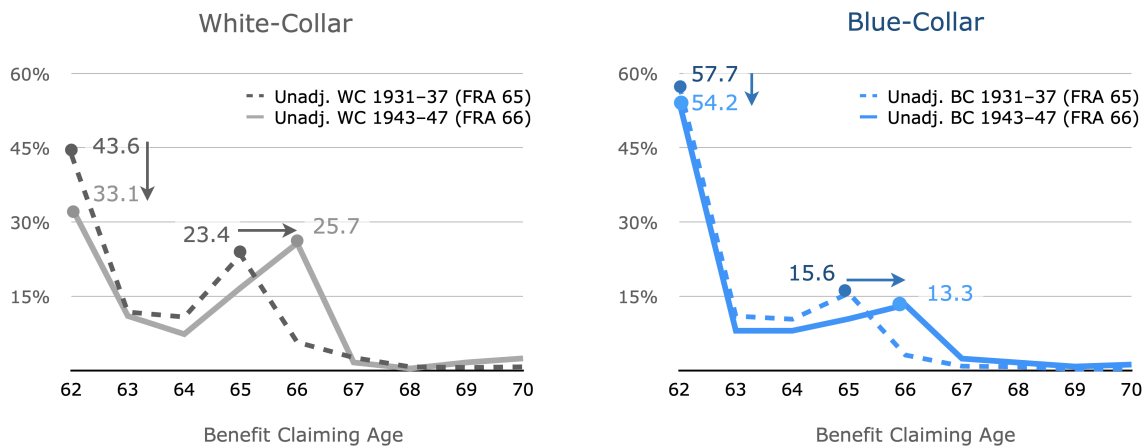


FIGURE 12: *Changes in OASI Benefit Claiming Ages by Occupation (Unadjusted)*



Note: 2,310 person observations, HRS men born 1931–37 or 1943–47 who have neither received nor applied for SSDI. Unadjusted figures do not control for early income, education, race, or region.

TABLE 6: Summary of Variables

<i>Description</i>	
<i>State Variables:</i>	
t	Age at time t
p_{t-1}	Participation decision last period
A_t	Total assets (quintile)
h_t	Health status: good, fair and poor
d_t	Functional limitation (binary)
OCC	Occupation
$AIME_t$	Average Indexed Monthly Earnings (SS Covered Income History)
<i>Choice Variables:</i>	
p_t	Labor force participation (none, PT, FT)
c_t	Consumption/savings
$OASI_t$	OASI benefit claiming
DI_t	SSDI benefit application
<i>Preference Parameters:</i>	
α_c	Consumption weight
β	Time discount factor
η	Coefficient of relative risk
N_t	Fixed utility cost of work, intercept
φ_p	Utility cost of work, with time trend
φ_{BC,h^p}	Utility cost of working in poor health, BC occupation
φ_{WC,h^p}	Utility cost of working in poor health, WC occupation
φ_{DI}	Utility cost of applying for DI
θ_b	Bequest weight
K_0	Bequest shifter

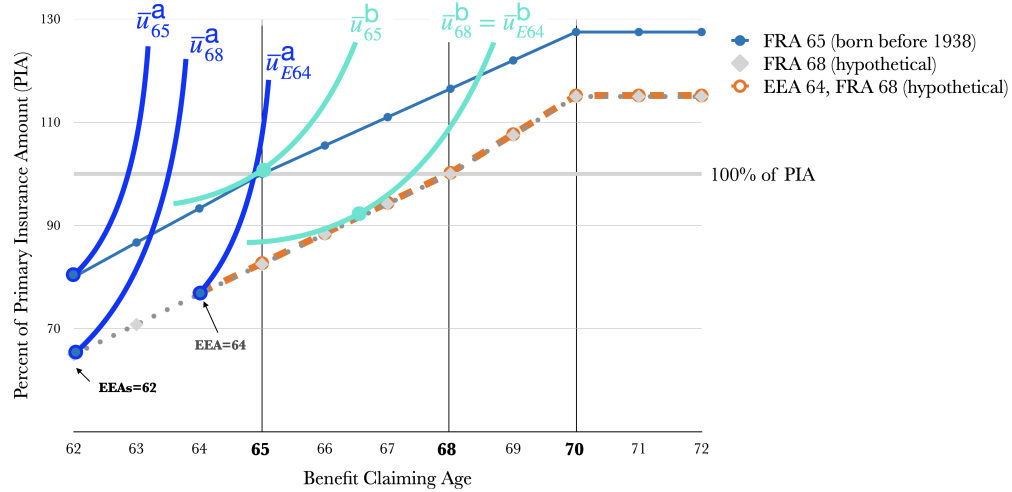
C. Additional Tables

Figure 13 illustrates hypothetical level curves for two person types, **a** and **b**, numerically constructed from utility preference parameters, occupation, wealth, health and longevity expectations. Person **a** is at a corner solution and optimally chooses to claim benefits at the earliest eligibility age (EEA) under all three policies, with $\bar{u}_{65}^a > \bar{u}_{68}^a > \bar{u}_{E64}^a$. Person **b** has greater willingness to delay claiming for higher benefits, and optimally chooses to claim at age 65 under a policy where the Full Retirement Age (FRA) is 65. Her optimal claiming age when the FRA is 68 increases (though not to age 68), and is no different under a policy where the EEA is raised from 62 to 64, so that $\bar{u}_{65}^b > \bar{u}_{68}^b = \bar{u}_{E64}^b$.

D. Social Security Benefit Calculation Details

The Social Security benefit calculation is embedded in the model's mapping from lifetime earnings and claiming decisions to benefit receipts. Below I describe the main mechanics for Old-Age and Disability benefits, as well as related benefit types.

FIGURE 13: *Adjustments in Claiming Ages by Hypothetical State and Preferences Types*



Note: This depicts numerically constructed hypothetical level curves for two person types under three different Social Security claiming age and benefit policies, described in the text.

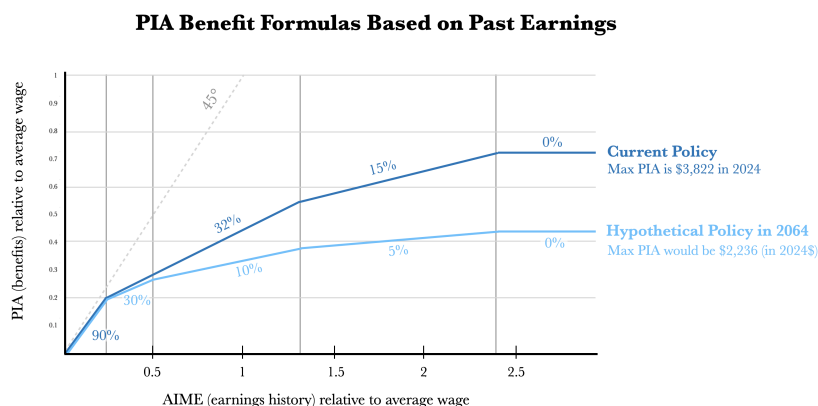
Benefits depend on (1) a person’s birth year, which determines the Full Retirement Age (FRA), (2) the age at which they claim benefits, and (3) their “covered” earnings history, which is any income subject to payroll taxation.

Primary Insurance Amount. The monthly benefit a person would receive if they claim exactly at their FRA is called the Primary Insurance Amount (PIA). To compute the PIA, SSA first calculates the Average Indexed Monthly Earnings (AIME), based on the 35 highest indexed years of covered earnings. Earnings are indexed to wage growth (via the national average wage index) to reflect the evolution of average wages (Social Security Trustees, 2024). The formula that determines PIA applies fixed replacement rates to segments of that AIME, set at “bend points” relative to average national earnings, producing a piecewise-linear, progressive benefit formula. The first portion of AIME translates to PIA benefit replacement of 90%, the second by 32%, and the third segment by 15%, and 0% thereafter. The bend-point dollar values are indexed to average wage growth over time. The PIA benefit amount is progressive in that the payroll tax rate is a flat rate of 12.4 percent, and those with lower earnings histories receive a higher implicit replacement rate. Figure 14 shows the PIA bend-point schedule under current law, and also the alternative, more progressive bend points used in the counterfactual policies in Section 4.3.

Claiming Age Adjustments: Early and Delayed Retirement Once the PIA is determined, the actual benefit depends on when one claims OASI retirement benefits relative to their FRA. The schedule is depicted in Figure 15, along with the counterfactual FRA and EEA ages in Section 4. Claiming at ones Full Retirement Age means a person gets 100 percent of their PIA, and claiming later (“delayed claiming”) increases benefits. At higher FRAs, benefits at all claiming ages are lower¹⁷ To receive OASI benefits, a claimant must (i) have reached at least age 62, and (ii) satisfy minimum eligibility in covered earnings (typically 40 quarters of social security credits).

¹⁷The exception is in the increase from 65 to 66 as the FRA. where delayed claiming past age 68 resulted in greater benefits.

FIGURE 14: Social Security Benefit Formula “Bend Points” Relative to AIME



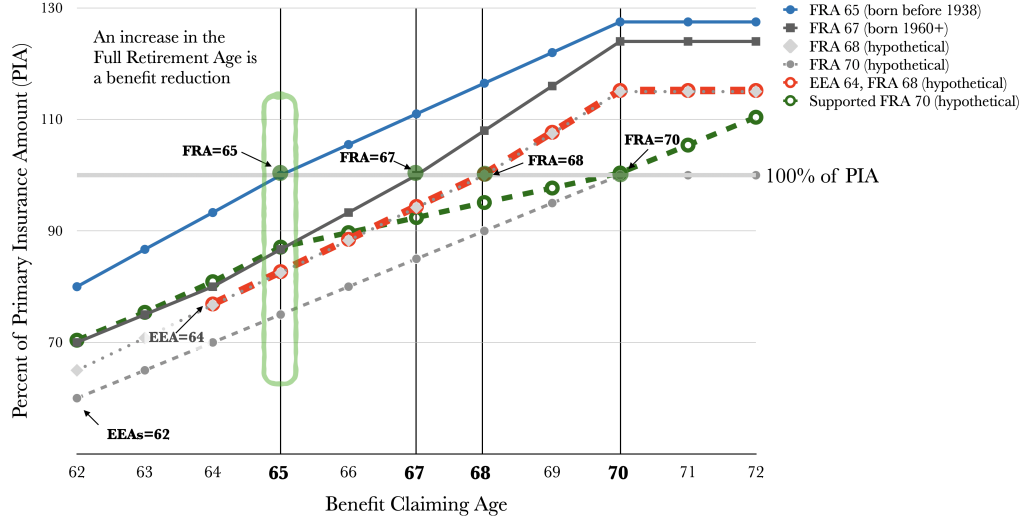
Claiming before one’s FRA results in a permanent reduction of benefits relative to one’s PIA. For individuals born in 1943 or later, the reduction is computed as $5/9$ of one percent per month for the first 36 months early, and $5/12$ of one percent per month for each subsequent month. Claiming after FRA yields delayed retirement credits (DRCs). For those born in 1943 or later, delaying benefit receipt increases the monthly benefit by 8% per year up to age 70. These adjustments are on average actuarially fair: Earlier claimers receive smaller monthly benefits but over a longer period; late claimers get higher monthly benefits but fewer months of receipt. However, given heterogeneity in the population—differences in life expectancy, rates of time preference, etc.—most would not be indifferent to actuarial adjustments based on the average population.

Figure 15 depicts the percentage adjustment in benefits relative to PIA by claiming age under both current and counterfactual reform schedules.

Social Security Disability Benefits (SSDI) Social Security Disability Benefits (SSDI) benefits also depend on one’s covered earnings history and use essentially the same PIA formula. As described in Section , the approval process and waiting periods for SSDI can be lengthy and involve medical adjudication. If awarded, regardless of age, a beneficiary receives a benefit equal to 100% of their PIA—the amount that they would have received if claiming OASI retirement benefits at their FRA. Upon reaching full retirement age, SSDI benefits become OASI benefits automatically.

Spouse, Survivor, Dependent Benefits. Other benefits—such as spousal, survivor, or dependent benefits—are functionally linked to the PIA of the covered worker. For instance, a spouse may be eligible for up to 50% of the worker’s PIA (if claiming at their FRA), subject to certain rules. Survivor benefits, likewise, often depend on the deceased worker’s PIA, potentially with reductions or adjustments for timing or remarriage.

FIGURE 15: Adjustment in Social Security Benefits Relative to PIA by Claiming Age



E. First-Stage Estimates

E.1. Health and Mortality Transitions

The transition processes for overall, self-reported health (h) that may diminish productivity in work and lead to greater levels of precautionary savings is shown, conditional on current health and age, in Figure 16. In this table, we see that the probability of remaining in good health declines with age, as does the probability of transitioning from poor to good health. While the distribution of health is somewhat different for those in blue-collar and white-collar occupations, the transition probabilities themselves are not significantly different, at least at the older ages analyzed here. While the transition process faced by individuals does not depend on occupation, we will see in the wage estimates shown in Table 8 that the effects on productivity of worsening health are greater for those in blue-collar occupations.

E.2. Functional Limitation Transition Process

The probability of a functional limitation being present in the next period and limiting work depends on an individual's current self-reported health (h_t), occupation (OCC_t), and existing functional limitation status (d_t). The probability of having at least one functional limitation in the next period, given that an individual is in good health in the current period is shown in Table 7. We can see that the conditional probability of a functional limitation arising is always greater for those in blue-collar jobs; though interpretation of this is not entirely straightforward. Because more physical jobs have a higher standard for physical capability, whether significant loss of a function prohibits work depends on the nature of the work. Furthermore, even if the functional limitation does not prohibit work altogether, as with worsening general health, it does result in a greater loss of earnings for those in blue-collar jobs, as presented in Table ??.

FIGURE 16: Health and Mortality Transitions

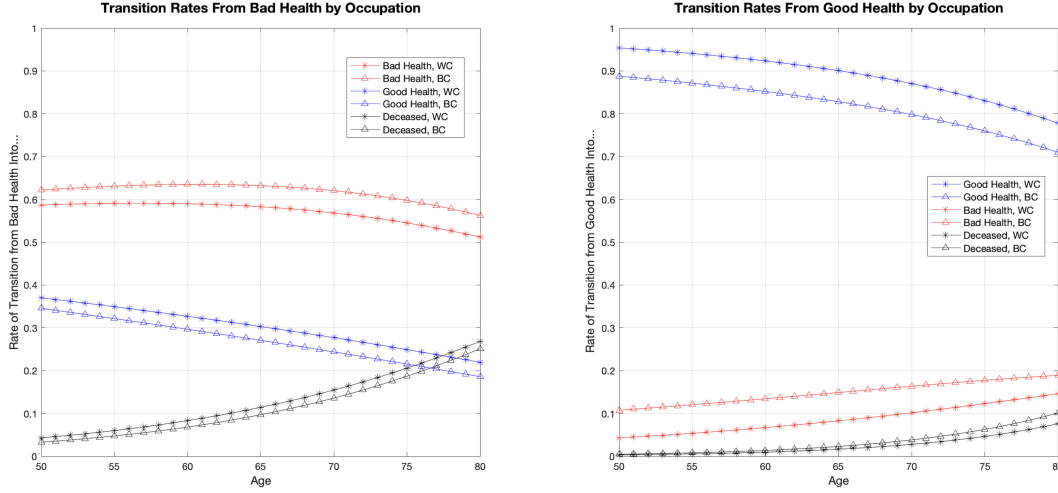


TABLE 7: Probability of Having at least one Functional Limitation Preventing Work Next Period for Select Ages and Good Health by Occupation

Age	BC Career		WC Career	
	<i>Current Limitation</i>		<i>Current Limitation</i>	
	No	Yes	No	Yes
55	.47	.53	.72	.28
65	.42	.58	.56	.44

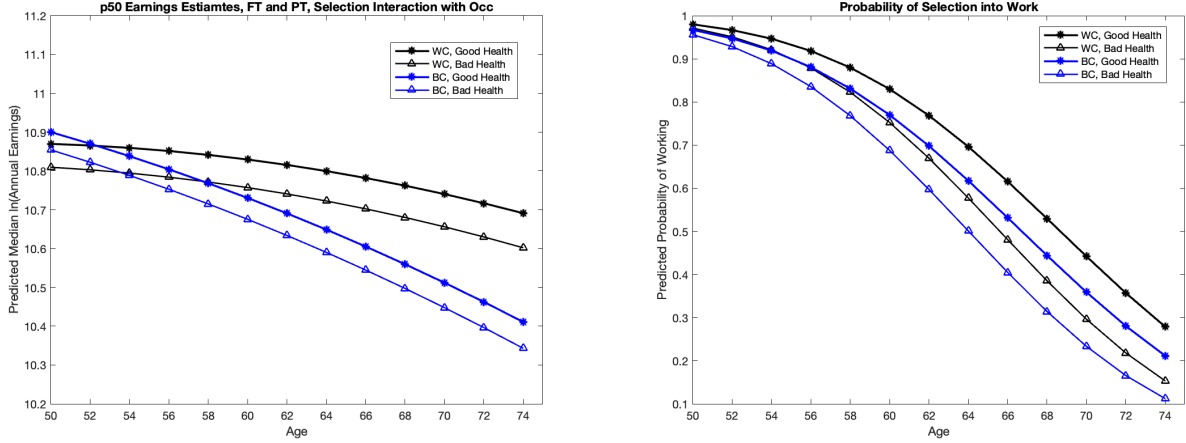
E.3. Wage Estimates

This is an important aspect: BC worked exit earlier due to more steeply declining wages and increasingly greater disutility from physical work.

[rephrase: [Casanova \(2013\)](#) notes that the commonly assumed declining wage-age profile is, rather, a declining *earnings*-age profile that reflects the increasing prevalence of part-time work among older workers, rather than true declines in offered wages. She argues that the correct specification for the offered wage profile may in fact be flat with age. This raises the question of whether older individuals reduce hours due to changing preferences or because productivity declines manifest as reduced hours rather than lower wages. Indeed, [Rupert and Zanella \(2015\)](#) find that for most cohorts in PSID data, wages do not decline with age, and reduced average earnings with age come from both dramatic and gradual reductions in hours approaching eventual retirement. [Angrisani et al. \(2017\)](#) argue that it could be the nature of any part-time work is different, in addition to the reduced hours alone providing more work-life balance that people may be willing to pay for, increasingly so with age.]

Estimated wages depend on age, health, and functional limitations interacted with occupation.

FIGURE 17: Median Predicted Earnings and Probability of Working



Specifically,

$$\begin{aligned} \ln w_t = & + \gamma_0 + \gamma_1 N_t + \gamma_2 \text{Age}_t + \gamma_3 \text{Age}_t^2 \\ & + \gamma_4 \mathbb{1}_{BC, \text{poor } H} + \gamma_5 \mathbb{1}_{WC, \text{poor } H} \\ & + \gamma_6 \mathbb{1}_{BC, \text{func. lim.}} + \gamma_7 \mathbb{1}_{WC, \text{func. lim.}} + \varsigma_t \end{aligned} \quad (7)$$

autoregressive component $\varsigma_t = \rho \varsigma_{t-1} + \nu_t$, with correlation coefficient ρ and transitory shock $\nu_t \sim N(0, \sigma_\nu^2)$. It is assumed that the individual knows ς_{t-1} and the distribution of future ν_t but not ν_t itself.

Observed annual earnings do fall at older ages, however [Rupert and Zanella \(2015\)](#), ? find that this reflects largely a reduction in hours after age 50 as opposed to wages.

Wage Specification

Let i index individuals. Define $\text{Work}_i \in \{0, 1\}$, $\text{Earn}_i = \ln(\text{earnings}_i)$, age A_i , health Good_i (excl./very good/good), occupation type WC_i (white-collar; baseline: BC), assets $S_i = \ln(\text{total assets \& pension})$, and baseline earnings $Y_i = \ln(\text{initial earnings})$. Let λ_i denote the inverse Mills ratio from the first stage.

First stage (Probit: selection into work).

$$\Pr(\text{Work}_i = 1 \mid Z_i) = \Phi\left(\alpha_0 + \alpha_1 A_i + \alpha_2 \text{Good}_i + \alpha_3 A_i \cdot \text{Good}_i + \beta_1 \text{WC}_i + \beta_2 \text{WC}_i \cdot \text{Good}_i + \gamma_1 S_i + \gamma_2 Y_i + \gamma_3 S_i \cdot Y_i\right), \quad (8)$$

where $\Phi(\cdot)$ denotes the standard normal cdf.

This corresponds to:

- Age: `rWagey_m_` and interaction with health (`rWshlt_BINA#c.rWagey_m_`);
- Health: `i.rWshlt_BINA`;
- Occupation: `i.OccType` (WC vs. BC) and interaction with health;

TABLE 8: Median (Quantile Regression of Log Earnings

<i>Second stage: Median Log(earnings)</i>			
	Coefficient	(s.e.)	P-value
Occ. type: WC	-0.922	(0.618)	0.136
BC $\times$ good health $\times$ age	0.001	(0.000)	0.001
WC $\times$ fair/poor $\times$ age	0.013	(0.008)	0.108
WC $\times$ good health $\times$ age	0.014	(0.008)	0.066
Age (rWagey_m.)	0.009	(0.020)	0.653
Age ²	-0.000	(0.000)	0.164
Mills	-0.447	(0.159)	0.005
WC $\times$ Mills	0.326	(0.223)	0.143
ln(earnings) _{t-1}	0.805	(0.009)	0.000
Birth year (rabyear)	0.002	(0.001)	0.020
FT > 30 (vs. PT)	0.289	(0.022)	0.000
Constant	-1.780	(2.031)	0.381
Observations	7,751		
Bootstrap replications	20		
Pseudo R ²	0.437		
<i>First stage: Probability of Working (Probit)</i>			
	Coefficient	(s.e.)	P-value
Age (rWagey_m.)	-0.122	(0.003)	0.000
Good/very good health	-0.456	(0.246)	0.064
Age $\times$ good health	0.012	(0.004)	0.002
Occ. type: WC	0.193	(0.039)	0.000
WC $\times$ good health	0.022	(0.043)	0.600
ihs(total assets & pension est.)	0.080	(0.025)	0.001
ln(initial earnings)	0.112	(0.034)	0.001
Assets $\times$ ln(initial earnings)	-0.010	(0.002)	0.000
Constant	6.886	(0.411)	0.000
Observations	33,160		
Log likelihood	-17,713.3		
LR $\chi^2(13)$	8,483.0		
Prob > χ^2	0.000		
Pseudo R ²	0.193		

- Assets: `ihs.initialTotAssets_PensionEst`;
- Initial earnings: `ln_initialAnnEarn`, plus interaction with assets.

Second stage (Median quantile regression of log earnings). For the conditional median ($q = 0.50$):

$$\begin{aligned}
Q_{0.5}[\text{Earn}_i \mid X_i] = & \theta_0 + \theta_1 \text{WC}_i + \psi_1 \text{BC}_i \cdot \text{Good}_i \cdot A_i + \psi_2 \text{WC}_i \cdot \mathbb{1}_{\text{Fair/Poor}} \cdot A_i + \psi_3 \text{WC}_i \cdot \text{Good}_i \cdot A_i \\
& + \delta_1 A_i + \delta_2 A_i^2 + \rho_1 \lambda_i + \rho_2 (\text{WC}_i \cdot \lambda_i) + \phi \ln(\text{earnings})_{i,t-1} \\
& + \kappa \text{BirthYear}_i + \xi \mathbb{1}_{\text{FT} > 30}.
\end{aligned} \tag{9}$$

This mirrors:

- Occupation type: `i.OccType`;
- Triple interactions: `i.OccType#i.rWshlt.BINA#c.rWagey_m_`;
- Age and age²: `c.rWagey_m_##c.rWagey_m_`;
- Selection correction: `mills` and `c.mills#i.OccType`;
- Lagged dependent variable: `ln_rWearn2015dollLAST`;
- Birth cohort: `rabyear`;
- Full-time indicator: `i.rWorkFTPT`.

Sample restrictions.

- **First stage (probit):** estimated on $N = 33,160$ individuals (selection model inputs).
- **Second stage (sqreg):** restricted to `SSA_sample = 1`, `rdnepiEver = 0`, $49 < \text{initialAge} < 56$, and working status `rWorkFTPT` $\in \{1, 2\}$. Median quantile ($q = 0.50$) estimated with 20 bootstrap replications.

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