ALL OR NOTHING: HEALTH, LABOR AND THE U.S. SOCIAL SECURITY DISABILITY INSURANCE PROGRAM

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May 13, 2025

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Abstract

The Social Security Disability Insurance (SSDI) policy evaluates applicants' health as a binary outcome and creates incentives to exaggerate or even exacerbate one's health problems to acquire eligibility. Using Health and Retirement Study data and the Method of Simulated Moments, I estimate an individual decision-making model that allows the evaluation of the labor and health effects of changes in the SSDI design. Specifically, I focus on a modification that allows disability benefits for the partially disabled Americans aged between 51 and Social Security's full retirement age. According to simulations, this reform will increase the labor supply of this age group by ∼6 p.p. and decrease their mortality rate by up to 0.1 p.p. Back-of-the-envelope calculations show that, thanks to the reform, ∼3 million Americans will postpone their retirement, and ∼40,000 Americans will have longer lives. After accounting for increased taxes, the investment required to prolong one person's life by one year is ∼$17,000.

Keywords: Disability, Social Security, Mortality, Health, Retirement, Medicare

JEL Classification: H55, I18, J14, J22, J26

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1 Introduction

The Social Security Disability Insurance (SSDI) program is the principal public disability insurance program for disabled individuals in the US. According to the US Social Security Administration, in December 2019, 10 million people received SSDI benefits that totaled \$11.7 billion. The primary purpose of this program is to protect against severe medical conditions that prevent recipients from working for a long period. The impact of this program on labor force participation is well established. However, evidence on the effects of SSDI on health is relatively scarce and inconclusive.

This paper explores how actual and counterfactual SSDI programs shape participants' health outcomes. All existing research devoted to analyzing the effects of SSDI on health is based on reduced-form models that do not permit the analysis of alternative insurance designs. This study is the first to analyze these effects using a structural model that allows predictions of outcomes under counterfactual insurance designs. In this article, I examine the consequences of partial disability insurance payments for partial disabilities. In particular, I focus on health outcomes under this counterfactual scenario. In the case of partial disability insurance, not only fully disabled individuals but also those who are partially disabled will be expected to receive benefits. This modification of the SSDI program might serve as a valuable early intervention mechanism that can improve the health of recipients.

The US government's last significant modification of the SSDI design was the Ticket-to-Work program of 1999. This program allowed disability insurance recipients to keep some part of their benefits for a couple of years in the event that these recipients returned to work. Multiple economists have recently called for SSDI program reforms (e.g., Autor and Duggan, 2006; Liebman, 2015; Yin, 2015). One of the most frequently suggested SSDI reforms is the introduction of partial disability insurance benefits.

Although health is multifaceted, the existing SSDI policy treats health as a binary outcome. In the absence of a partial disability insurance option, partially disabled individuals who have disabilities but are still able to work have significant incentives to exaggerate or even exacerbate their health problems. Many partially disabled individuals succeed in obtaining SSDI benefits. According to Benitez-Silva et al. (2004), 20% of SSDI recipients report they do not have a health problem that prevents them from working. If work-conditional partial disability insurance benefits for the partially disabled were available, partially disabled individuals could receive substantial incentives to continue working, potentially improving their health.

The current SSDI policy does not cover all the existing demand for disability insurance. Only a minority, $\sim 30\%$, of SSDI applications are approved.[1] About half of rejected SSDI applicants continue to work (e.g., Bound, 1989; Chen and Klaauw, 2008; Maestas et al., 2013; French and Song, 2014). These rejected SSDI applicants who continue working are not fully disabled. They either have no disabilities or have disabilities that do not fully prevent them from working. Americans whose disabilities do not prevent them from working altogether have incentives to apply for existing SSDI benefits. These Americans with disabilities earn significantly less than those without disabilities.[2] Simultaneously, these partially disabled individuals bear much higher out-of-pocket costs (Kennedy et al., 2017).

While the contemporary SSDI program does not address the needs of disabled Americans, its size is more than two times larger than spending on unemployment insurance.[3] In light of this, some economists have called for tightening eligibility criteria or reducing benefits (e.g., Golosov and Tsyvinski, 2006; Haller et al., 2024). On the other hand, the Organization for Economic Cooperation and Development notes the US spends considerably less on disability benefits relative to other developed countries and calls for SSDI expansion.[4]

Disability programs with partial disability insurance benefits for partially disabled people are common among the Organization for Economic Cooperation and Development (OECD) members. Partial disability insurance programs exist in Australia, Germany, Japan, the Netherlands, and Norway. For example, in Norway, people receive partial disability insurance

[1] Annual Statistical Report on the Social Security Disability Insurance Program, 2023
[2] The Census Bureau data on economics characteristics for the population by disability status
[3] Annual Statistical Supplement to the Social Security Bulletin, 2017, the Social Security Administration
[4] Chart Book: Social Security Disability Insurance by the Center on Budget and Policy Priorities

if their working capacity is reduced by 50% or more, and the amount of disability insurance benefits is based on the precise percentage of an individual's capacity to work.[5] In the report Sickness, Disability and Work: Breaking the Barriers, the OECD recommends that the US introduce early interventions and access to support, and remove disincentives to work for the partially disabled.[6]

The literature unambiguously shows that early retirement in the US increases mortality (Fitzpatrick and Moore, 2018; Snyder and Evans, 2006). Fitzpatrick and Moore (2018) exploit a discontinuous increase in retirement at age 62, the minimum eligibility age for Social Security Old Age benefits. Not only does the retirement rate jump at age 62, but also the mortality rate. Using Health and Retirement Study data, I can perform a similar analysis (see Figure 1 and Table 1) and identify a jump in both retirement and mortality for the partially disabled Americans at age 62, implying that this group of Americans particularly increases their mortality following retirement.

This article aims to answer the following question. How will the mortality rate and disability propensity change due to the introduction of a disability insurance program for the partially disabled and consequent changes in income, health insurance coverage, and labor supply? Using the Method of Simulated Moments, I estimate a model that simulates labor supply and disability insurance application choices. By incorporating the utility cost of working while being partially disabled and allowing for heterogeneous health effects of employment, I simulate how individuals self-select into employment and disability insurance recipiency. I use the Health and Retirement Study data to estimate my model. These data are representative of the US population only above 51 years old. As a result, I focus on these older individuals. This is not a significant drawback, as 77% of SSDI beneficiaries are above 51 years old.

As discussed in more detail in the next section, the literature on the health effects of disability insurance is limited and consists solely of reduced-form studies. This paper is the

[5] The Norwegian Labour and Welfare Administration
[6] OECD (2010) — Sickness, Disability and Work: Breaking the Barriers

first to develop and estimate a structural model for the health effects of disability insurance. I test the credibility of my model by examining how it fits the data (internal validity) and how the estimation results align with those in the reduced-form literature (external validity). As I show in the following sections, my model fits the data quite well, and the estimated parameters align with those reported in the existing literature. The retrieved parameters allow for the analysis of counterfactual modifications of the existing public disability insurance program in the US.

I consider the following partial disability insurance (DI) reform. Under the reform, partially disabled people can apply for partial DI benefits calculated in the same way as existing SSDI benefits. These partial DI benefits will also depend on earnings history, average indexed monthly earnings (AIME). If a partially disabled individual's earnings exceed a specified threshold, substantial gainful activity amount ($1,620/month in 2025), then the partial DI benefits are reduced by $1 for each extra $1. A partial DI beneficiary does not receive early access to Medicare but has insurance from the onset of full disability. If a partial DI beneficiary claims to be fully disabled, they can choose to stop working and apply for full benefits while receiving these full benefits for the period of the application. If their application is approved, they continue receiving full benefits, whereas if it is not approved, they stop receiving any benefits. Like full DI benefits, partial DI benefits have an age cap — full retirement age (FRA). Similar to full DI benefits, partial DI benefits are available only for those below the FRA. In contrast with full DI program beneficiaries, partial DI program recipients are not automatically granted Social Security Old-Age benefits (SSOA) upon reaching FRA and can claim SSOA at an older age at their discretion.

Following this outlined partial disability insurance reform, partially disabled individuals increase their labor supply and do not retire prematurely. The effect of the reform on the labor supply varies with age. The increase in the percentage of the partially disabled who work full-time is the largest for 51-year-olds. The share of partially disabled people working part-time, on average, increases more than that of those who work full-time. For 57-year-olds, this former share skyrockets by 17 p.p. The reform's effect on the overall employment of all Americans ages 51 to 70, regardless of their disability status, is more modest, $\sim$6 p.p.

These changes in labor supply decisions have positive effects on health. The impact on the propensity for disability is most significant for 60-year-olds. Among 60-year-olds, the percentage of those without disabilities increases by $\sim$1 p.p. The decrease in the mortality rate is most significant for 60-year-old Americans. Their mortality rate declines by around 0.1 p.p. After 60, the mortality rate declines less and less, but the increase in survival rate continues growing and peaks around 70 with about a 1 p.p. increase. I perform back-of-the-envelope calculations based on these changes in percentages and the number of Americans of a given age in 2024. According to back-of-the-envelope estimates, thanks to the partial disability insurance reform, $\sim$40,000 Americans will live longer. The reform will not only save lives but also improve the quality of life, which is epitomized by the decrease in the total number of disabled 50–70-year-olds by about 1%.

These health benefits will come with an increase in the cost of the SSDI program. However, this increase will be smoothed out by a massive shift of the partially disabled from full to partial benefits and increased income and payroll taxes. Following the reform, $\sim$70% of the partially disabled who applied for full disability benefits will switch to applying for partial benefits. Due to the increase in labor supply, payroll and income taxes will increase by 2% for the age group considered. After accounting for increased taxes, the expenditure required to extend one person's life by a year is approximately \$17,000. This is below common estimates of the value of one year of life (Murphy and Topel, 2006), which are typically above \$100,000.

Moreover, I analyze alternative designs for partial disability insurance reform. Namely, I examine how different sizes of the partial DI benefits, early access to Medicare, employment requirements, and benefits award probability change the health effects of the reform. Under the primary version of the reform, partial DI benefits are calculated in the same way as the existing SSDI benefits. Alternatively, partial DI benefits can constitute the taxes that working partially disabled individuals are paying. Since the partially disabled earn a little, the benefits and corresponding decrease in mortality will be lower. On the other hand, the reform would not increase the cost of the DI program. Early access to Medicare has little impact on the mortality rate, as the partially disabled can receive health insurance from other sources, and the health effects of health insurance are small. Finally, if the employment requirements are lifted or if the benefits award probability is low, the health effects are considerably smaller.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 provides background information. Section 4 describes the data. Section 5 presents the reduced-form evidence. Section 6 outlines the model. Section 7 discusses the identification and estimation. Section 8 discusses the results of the counterfactual partial disability insurance reform. Section 9 examines alternative designs for this reform. Section 10 concludes.

2 Literature Review

One of the most fundamental health and public economics questions is how income from government programs can influence beneficiaries' health outcomes. Many papers have focused on this research question. The conclusions depend on the context and details of the designs of these programs. Most of the research focuses on the effects of health insurance on health, while the impact of disability insurance on health is much less analyzed.

The literature on the relationship between disability insurance and health is scarce and inconclusive. Ziebarth (2018) summarizes:"Despite the richness of the literature, there is a severe paucity of evidence on the short and long-term health effects of disability insurance." Several papers have concluded that receiving disability insurance benefits positively affects health (e.g., Meara and Skinner, 2011; Gelber et al., 2023). In particular, Gelber et al. (2023) exploit "bend points" in DI payment formulas and conclude that an increase of $1,000 in annual DI payments decreases beneficiaries' probability of mortality over the next four years by 0.47 percentage points per year. However, another study concluded that disability insurance does not impact physical health (Börsch-Supan et al., 2014).

Meanwhile, other economists emphasize the heterogeneity of disability insurance effects on health outcomes (Garcia-Gomez and Gielen, 2018; Black et al., 2024). As regards Garcia-Gomez and Gielen (2018), they stressed that disability insurance affects the mortality of people of different genders in different ways. As for Black et al. (2024), they concluded that the impact of SSDI on a recipient's mortality can depend on the severity of this person's disability. Black et al. (2024) analyzed the effects of the assignment of judges to SSDI cases. For marginal recipients who receive benefits only if seen by lenient judges, the receipt of disability insurance benefits increases mortality. However, mortality was reduced for those recipients who would receive benefits even if seen by a relatively strict judge. This might imply that fully disabled individuals benefit from the current SSDI, while those who could have been assigned partial disability insurance are harmed by the current SSDI policy.

All the papers to date analyze the effects of disability insurance on health using reduced-form empirical models. The researchers ran linear regressions with and without individual fixed effects and instrumental variable regressions to estimate these effects. For this purpose, economists also used regression kink and discontinuity designs. This paper aims to fill the gap in the literature by being the first paper to estimate the health effects of the receipt of disability insurance benefits using a structural model. Structural estimation permits the analysis of counterfactual scenarios that cannot be analyzed using reduced-form methods. In particular, this article concentrates on the health effects of the counterfactual partial disability insurance.

The impact of disability insurance on labor force participation is much less ambiguous than that on health outcomes. Nearly all existing papers found this impact to be negative. Based on reduced-form and structural estimations, various economists estimated how many people would remain in the labor force without the SSDI program (e.g., Maestas et al., 2013; French and Song, 2014; Maestas et al., 2021). Their estimates are between one-fifth and one-third of current SSDI beneficiaries. The US has not experienced reforms of the disability insurance system for a long time. However, many other countries have had recent disability insurance program reforms. Multiple papers are devoted to analyzing the consequences of such reforms (e.g., Gruber, 2000; Jonsson et al., 2012). The common findings are that more generous programs can decrease labor supply. The large number of disability insurance beneficiaries who can continue to work is not unique to the US. Kostøl and Mogstad (2014) show that many disability insurance beneficiaries in Norway can be motivated to join the labor force by providing financial work incentives. My contribution to this literature is a joint estimation and prediction of labor force participation and health outcomes.

The closest paper to this study is Yin (2015). This is the only study discussing the consequences of the introduction of partial benefits for partially disabled people in the US. Yin (2015) analyzes the effects of this modification on individuals' labor force supply and savings decisions. However, Yin (2015) does not focus on health outcomes. Yin (2015) takes survival rates from the 1997 US Life Tables and treats these rates as constants for each age of an individual. In contrast to Yin (2015), this study analyzes how partial disability insurance benefits affect beneficiaries' health outcomes. In this article, I consider health-related variables as outcome variables.

Several studies have also analyzed disability insurance policies from the viewpoint of welfare. These studies conclude that more generous disability insurance policies can increase welfare (e.g., Bound et al., 2004; Low and Pistaferri, 2015; Meyer and Mok, 2019; Autor et al., 2019). Autor et al.'s (2019) conclusions imply that savings have little effect on the decisions of SSDI applicants, as they tend to have very low savings. Motivated by this, I abstain from including savings decisions in my model. Another paper examines the welfare implications of bad health in general and concludes that the main channel is a shortened life span (De Nardi et al., 2024). This paper contributes to these threads of literature by examining a particular kind of more generous disability insurance policy that extends longevity.

While the literature on the health effects of disability insurance is limited, rich literature on the health effects of health insurance exists (e.g., Hall and Jones, 2007; Blau and Gilleskie, 2008; Finkelstein and McKnight, 2008; Yang et al., 2009; Finkelstein et al., 2012; Goldin et al., 2021; Miller et al., 2021). Common findings in this literature are that more generous health insurance moderately affects mortality. I simulate health-related outcomes and their dynamics in a way very close to that utilized in Khwaja (2001).

Moreover, my paper builds on ideas from Poterba et al. (2013). Following Poterba et al. (2013), I created a health measure that aggregates self-reported health status, doctor-diagnosed health problems, difficulties in Activities of Daily Living (ADLs), and Instrumental Activities of Daily Living (IADLs), mental health problems (eight Center of Epidemiological Studies of Depression questions), and medical utilization. I call this health measure a health index. The data on these health problems, difficulties in ADLs and IADLs, and medical utilization are discrete. Consequently, the estimation of polychoric correlations is preferred (Kolesnikov and Angeles, 2004). Therefore, I enhanced the method proposed by Poterba et al. (2013) by performing the polychoric principal component analysis instead of an ordinal one.

This study is also related to the broader literature on the influence of health on retirement. As a poor state of health and downward changes in health are among the main reasons for exit from the labor force (McGarry, 2004), partially disabled individuals might have an exceptionally high propensity to retire. Health can influence a desire to work in many ways. Firstly, poor health status might cause individuals to expect shorter lives. Such expectations will make these people less willing to accumulate more wealth, and these people will also be less productive (Hamermesh, 1985). Secondly, the marginal utility of leisure can be increased relative to that of consumption due to poor health (Capatina, 2015). Thus, the partially disabled are more likely to leave the labor force. Work-conditional partial DI benefits can incentivize the partially disabled to postpone their retirement.

Some researchers looked at the reverse effect and analyzed the influence of retirement on health. The partially disabled might retire if they are given disability insurance benefits that do not require them to continue working. Retirement has the potential to increase their well-being. However, several studies indicate that an earlier exit from the labor force can worsen the lives of retirees in many different ways. Retirement increases mortality (e.g., Snyder and Evans, 2006; Fitzpatrick and Moore, 2018; Kuhn et al., 2020). Besides, cognitive and mental health might also suffer due to earlier retirement (e.g., Rohwedder and Willis, 2010; Bonsang et al., 2012; Mazzonna and Peracchi, 2012; Börsch-Supann and Schuth, 2014). As there is growing evidence of the benefits of bridge employment (e.g., Wang, 2013), the introduction of partial disability insurance benefits that provide additional motivation for the partially disabled to get a part-time job before full retirement might be especially advantageous.

In summary, this paper's idea builds on two results from the existing literature. Following the introduction of partial disability insurance, the partially disabled will increase their labor supply and retire at an older age (Yin, 2015). Because of this, the mortality rate is expected to decrease (Snyder and Evans, 2006; Fitzpatrick and Moore, 2018; Kuhn et al., 2020). The questions are by how much the mortality rate will decrease, how many lives will be saved, and how much money this will cost.

The results of the estimations are in line with the existing literature. As in Yin (2015), the partial disability insurance reform is projected to increase the total labor supply of Americans (who are either partially disabled or not disabled) by about 6 p.p. for people around 60 years old. According to back-of-the-envelope calculations, under the suggested partial disability insurance reform, 3 million Americans will postpone their retirement, with tens of thousands of Americans extending their life spans. This is in line with the ∼1 p.p. effect of retirement on mortality reported in Fitzpatrick and Moore (2018).

3 Background

Social Security Disability Insurance is a key component of the US social safety net, designed to support Americans whose ability to work is impaired due to health-related issues. In 2023, around 9 million people received Social Security Disability Insurance benefits,[7]

[7] Annual Statistical Report on the Social Security Disability Insurance Program, 2023

totaling almost $13 billion/month.[8]

To qualify for Social Security Disability Insurance benefits, an individual must be insured, be younger than full retirement age, have applied for the benefits, and meet the definition of disability under the Social Security Act. As for the first requirement of being insured, a person must have worked enough and recently enough. As regards the last requirement on disability, the Social Security Act defines disability as "(A) inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than 12 months, or (B) in the case of an individual who has attained the age of 55 and is blind (within the meaning of blindness as defined in section 216(i)(1)), inability by reason of such blindness to engage in a substantial gainful activity requiring skills or abilities comparable to those of any gainful activity in which the individual has previously engaged with some regularity and over a substantial period of time."[9] A person is considered to be engaged in a substantial gainful activity (SGA) if they earn more than an SGA amount. In 2025, this amount is $1,620/month.[10]

The Social Security Act of 1935 introduced the Social Security program. Initially, the Act was crafted to pay benefits only to retired workers aged 65 and older. The Social Security Amendments of 1956 marked the introduction of the SSDI program, extending benefits to disabled workers aged 50 and older. Subsequent amendments expanded the program: in 1958, benefits were extended to dependents of disabled workers; in 1960, the age restriction for disabled workers was removed. A major reform occurred in 1972, when SSDI recipients who had received benefits for two consecutive years became eligible for early access to Medicare. Further reform came with the Social Security Amendments of 1980, which introduced a periodic review process for initial disability determinations. The most recent significant policy change occurred under the Ticket to Work and Work Incentives Improvement Act of

[8] Chart Book: Social Security Disability Insurance by the Center on Budget and Policy Priorities

[9] Social Security Act, Title II, Section 223

[10] Substantial Gainful Activity, the Social Security Administration website

1999. This legislation allowed SSDI recipients to continue receiving benefits for up to nine months while engaging in substantial gainful activity.

In the last 20 years, the Social Security Administration ran 14 demonstration projects to analyze how different SSDI program modifications can influence participants' well-being.[11] Two of these projects analyzed the option of offering partial disability insurance benefits for SSDI beneficiaries who are ready to return to the labor force. The analyses of these projects concluded that such modifications can not noticeably change the labor supply of SSDI recipients while substantially increasing the SSDI program's costs.[12] People who have already started to receive disability insurance benefits with no work requirements are very unlikely to start working again. Two attempts by the Social Security Administration to implement partial disability insurance benefits underscore how compelling this idea is for the government. In contrast to modifications tested by the Social Security Administration, the counterfactual reform considered in this paper focuses on partial disability insurance benefits for people who have not yet started to receive existing SSDI benefits.

Today, 75% of SSDI recipients are older than 50. Individuals without a college degree are much more likely to receive SSDI benefits.[13] In 2023, 34% of SSDI awards were granted based on the impairments of the musculoskeletal system and connective tissue, 13.6% — due to neoplasms, 12.7% — because of mental health disorders, 10.9% — because of circulatory system diseases, and 28.8% — based on other reasons.[14]

Individuals are eligible for Social Security Disability Insurance benefits if they meet specific work and disability criteria.[15] The exact criteria are complex and depend on the SSDI applicant's medical condition, age, education, and work history. However, if an individual developed one of over 100 "listed impairments," SSDI benefits are granted automatically.[16] Throughout the recent decade, only around 21% of individuals were provided benefits during

[11] Demonstration projects conducted by the Social Security Administration
[12] Benitez-Silva et al. (2011)
[13] Chart Book: Social Security Disability Insurance by the Center on Budget and Policy Priorities
[14] Annual Statistical Report on the Social Security Disability Insurance Program, 2023
[15] How you qualify for Social Security disability benefits
[16] Listings of impairments

their initial claims. The final award rate for claims filed during the last decade is 30%.[17] Thus, the demand for disability insurance in the US is much higher than the supply.

Social Security benefits are calculated based on Average Indexed Monthly Earnings (AIME). The Social Security Administration uses up to 35 years of highest earnings in the AIME calculation. According to the Social Security Administration, for an individual who first becomes eligible for SSDI benefits or Old-Age Insurance benefits in 2025, benefits will be the sum of 90% of the first $1,226 of their AIME, 32% of their AIME over $1,226 and through $7,391, and 15% of their AIME over $7,391.[18]

SSDI recipients can stop receiving benefits due to the following reasons: they turn the full retirement age (then SSDI benefits become Old-Age benefits), they earn above the significant gainful activity (SGA) amount for an extended period (0.6% of SSDI beneficiaries lost their disability insurance benefits because of this in 2019), they were regarded as medically able to engage in a SGA (0.4% of SSDI recipients had their benefits terminated because of this reason in 2019), they died (2.4% of SSDI benefits receivers died in 2019), or due to some other reasons (in 2019, 0.2% of SSDI recipients' benefits were terminated due to other reasons). Thus, once individuals receive SSDI benefits, they are unlikely to stop receiving benefits.

4 Data and Summary Statistics

4.1 Data and Sample Design

The data used in this study are the cross-sectional Health and Retirement Study (HRS) Public Survey data and RAND HRS Longitudinal File. HRS is a national longitudinal biennial household survey of individuals over 51 and their spouses. The HRS is sponsored by the National Institute on Aging (grant number NIA U01AG009740) and is conducted by the University of Michigan. More than 15,000 individuals who comprise more than 10,000 households are surveyed every two years. The RAND HRS Longitudinal File is a cleaned

[17] Annual Statistical Report on the Social Security Disability Insurance Program, 2023
[18] A PIA formula

dataset containing information from HRS, with derived and imputed variables covering an extensive range of topics.

The estimation sample consists of observations between 1994 and 2016, except for 2004. In the 2004 wave, disability questions were not asked of those who had disabilities in the previous wave. Due to this, for the 2004 wave, the transitions between different disability statuses cannot be analyzed. The HRS sample is not representative of the United States population below 51. Therefore, I exclude observations on individuals below 51 years old. I focus on individuals below 90 years old, as the effects of the proposed reform on mortality disappear by the point a person turns 90. Thus, I also delete all observations on people older than 90 years. Finally, I delete observations with missing data in the initial period of observation and a few observations with missing information on age.

4.2 Measures of Health Outcomes

The HRS has a variety of health-related variables. I construct and use two health measures. My first health measure is based on the following questions:

1. Do you have any impairment or health problem that limits the kind or amount of paid work you could do?
2. Does this limitation keep you from working altogether?

I classify individuals who state that they do not have any impairment or health problem that limits the kind or amount of paid work they could do as healthy individuals, those who argue that they have impairments that limit their work but do not prevent them from working altogether as partially disabled, and those who claim that they have limitations keeping them from working altogether as fully disabled.

Table 2 presents the health transition probabilities for the estimation sample. People are more likely to have the same level of disability as in the previous period. Those with a partial disability are more likely to become fully disabled than those without a disability, and those with a full disability are less likely to recover than those with a partial disability. Also, when a person's level of disability is higher, she is more likely to die. Specifically, the biennial mortality rate for people without disabilities is only 0.005%, while it is two and a half times higher (0.012%) for those with a partial disability and three and a half times higher (0.018%) for those who are fully disabled.

While Yin (2015) relies exclusively on the two aforementioned work-limitation questions to assess health, this paper focuses on the health effects of reforms to the SSDI program. Therefore, I construct my second health measure, a health index based on various other health-related variables. Similarly to Poterba et al. (2013), I chose 30 HRS variables to derive a health measure using Principal Component Analysis (PCA). The selected variables are related to self-reported health status, mental health, doctor-diagnosed diseases, functional limitations, and medical utilization. Like Poterba et al. (2013), I choose the standardized and inversed prime principal component that explains the biggest share of the variance as one of my health measures. I call this health measure a health index. Unlike Poterba et al. (2013), I use polychoric PCA, which takes into account the discreteness of the variables. My health index has several valuable properties:

- The health index is persistent and is predictive of the onset of disabilities and death (see Figure A1 in the online Appendix A).
- A health index predicts bad health events well (see Figure A2 in the online Appendix A).

4.3 Summary Statistics

The decision-making process in my model stops when people turn 70 years old. Therefore, in Table 3, I compare the summary statistics for respondents aged 51 to 70 years of age from my estimation sample with the summary statistics for those in the sample of all HRS respondents within this age range. In total, there are 137,612 observations from HRS respondents between 51 and 70 years of age. The estimation sample consists of 121,348 observations. The averages for the estimation sample and the full sample are reasonably close. Around 39% of the sample work full-time, and approximately 15.5% work part-time. About 6.5% are receiving SSDI benefits, and around 1.3% are applying for SSDI. Among fully disabled people, this percentage is higher than among partially disabled people, around 8.5% and approximately 3.6%, respectively. Approximately 16% of the respondents are partially disabled, and around 10% are fully disabled.

5 Reduced Form Evidence

The literature unambiguously shows that early retirement increases mortality for all Americans regardless of their disability status (Snyder and Evans, 2006; Fitzpatrick and Moore, 2018). An intriguing question is whether this holds for partially disabled Americans.

HRS data do not have as many observations on deaths as the datasets used in Snyder and Evans (2006) and Fitzpatrick and Moore (2018). However, in contrast to those datasets, the HRS data have information on self-reported disability statuses discussed in the previous section. Using HRS data, I can perform the regression discontinuity analysis similar to that performed in Fitzpatrick and Moore (2018), exploiting discontinuous eligibility for Social Security Old Age (SSOA) benefits when people turn 62 years old.

Figure 1 shows the retirement and 10-year mortality rate for all individuals in the estimation sample and for those particular individuals who have been partially disabled in both the current and previous periods and who do not receive existing SSDI benefits. When individuals turn 62, the minimum age for SSOA benefits, the share of retired individuals jumps for both the general sample and the latter particular group. However, a noticeable increase in the 10-year mortality rate at age 62 is observed only among individuals who were partially disabled in both the current and previous periods and did not receive SSDI. The size of the HRS sample does not allow for the identification of the mortality effect of retirement for the general sample. Nonetheless, the available sample is sufficient to identify a statistically significant 5 p.p. positive effect of retirement on 10-year mortality for Americans who had partial disability for two consecutive periods and who do not receive SSDI (see Table 1). In the online Appendix B, I discuss potential mechanisms for these mortality effects.

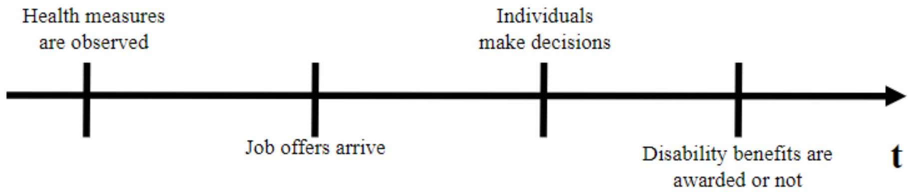
The outlined evidence implies that work-incentivizing partial disability insurance benefits will decrease the mortality rate for Americans. This conclusion is further verified with the estimation of the structural model and counterfactual simulations discussed in the next sections.

6 The Model

The dynamic behavioral model describes how individuals make decisions about work and the applications of Social Security benefits. I follow the general methodological approach of Rust and Phelan (1997). The closest paper to mine is Yin (2015), who introduced the first structural model to examine the labor supply effects of partial disability insurance reform in the US. I adjusted Yin's model of individuals' labor supply decisions to analyze the health effects of partial disability insurance reform. Disability insurance affects health through three channels: employment, amount of consumption, and health insurance. The effects of employment are heterogeneous for the partially disabled. The partially disabled consider the health effects of their decisions when self-selecting into employment and disability insurance. The model solution is provided in the online Appendix C.

6.1 Timing and initial conditions

In the model, the individuals are between 51, t_{min}, and 90, t_{max}. By age 70, t_R, people retire and stop making decisions. In each period, disability status and health index are observed first. Next, job offers arrive. Consequently, individuals make their decisions as described in the following subsection. Following this, the Social Security Administration awards SSDI.



The set of initial conditions,

$$\Omega_{t_0} = \{t_0, SSDI^i_{t_0}, D^i_{t_0}, H^i_{t_0}, AIME^i_{t_0}, a^i_{t_0}, e^i\},$$

consists of the initial year of observation, t_0, SSDI recipiency, $SSD^i_{t_0}$, statuses, their disability, $D^i_{t_0}$, health index, $H^i_{t_0}$, average income monthly earnings, $AIME^i_{t_0}$, the age of an individual, $a^i_{t_0}$, and education, e^i, during the initial period of observation.

6.2 Decisions and an Information Set

Forward-looking agents between 51, t_{min}, and 70, t_R, make decisions, Z^i_t, about:

- Employment: full-time $work^i_t = FT$, part-time $work^i_t = PT$, no work $work^i_t = N$
- Application for Social Security Disability Insurance benefits: $apply^i_t = FD$ if an individual is eligible for full SSDI benefits and claims them, $apply^i_t = PD$ if an individual is eligible for partial SSDI benefits and claims them, $apply^i_t = NO$, o/w
- Start receiving Social Security Old-Age benefits: $start^i_t = 1$ if an individual is eligible for Social Security Old-Age benefits and starts receiving them, $start^i_t = 0$, o/w.

Individuals make these choices, Z^i_t, based on information, Ω_t:

- Endogenous outcome variables:
  - SSDI outcomes: $SSDI^i_{t-1} = FD$ if an individual is awarded and receives full SSDI, $SSDI^i_{t-1} = PD$ if an individual is awarded and receives partial SSDI
  - First period of Social Security Old Age (SSOA) recipiency:

$SSOA^i_{t-1} = t_1$, if an individual has started receiving SSOA benefits in some period t_1, and $SSOA^i_{t-1} = NA$, if an individual has not started receiving SSOA yet

  - Disability status: $D^i_t = F$ if fully disabled, $D^i_t = P$ if partially disabled, $D^i_t = N$ if not disabled
  - Health index: H^i_t
  - Health insurance: I^i_t
  - Average indexed monthly earnings: $AIME^i_t$

- Exogenous variables:
  - Education: $e^i = 1$ for college graduates and $e^i = 0$, o/w
  - Age: a^i_t
  - Year: t.

6.3 The Utility of the Agents

The utility, $u^i_t(C^i_t, work^i_t, apply^i_t, start^i_t, D^i_t, H^i_t, SSOA^i_t)$, derived from consumption, C^i_t, varies with the employment, SSDI and SSOA statuses, disability, and the health index. Individuals make decisions while they are between 51, t_{min}, and 70, t_R.. To account for unobserved factors preceding the initial period of observation, the utility is adjusted by $\tilde{u}^i_{t_{min}}(\cdot)$,, which depends on whether individuals have been working or applying for SSDI benefits and their health during the initial period of observation. When individuals turn 70, t_R, they receive the utility $\tilde{u}^i_R(\cdot)$, which depends on their employment, Social Security, and disability statuses during the last period of decision making. The equations for $u^i_t(\cdot)$, $\tilde{u}^i_{t_{min}}(\cdot)$, and $\tilde{u}^i_R(\cdot)$ are presented in the online Appendix D. If individuals die before 70, they receive a terminal value of $\alpha_{terminal}$.

6.4 Social Security Benefits

To be eligible for full SSDI benefits, a person should not be working and should be partially or fully disabled. The likelihood of the award of these benefits, $\pi_t^{ai} = \pi^a(D_t^i, H_t^i, a_t^i, e^i)$, is assumed to depend on the disability status, D_t^i, health index, H_t^i, age dummy variables, education, e^i, where π^a is a logistic function. The size of Social Security benefits, SSB_t^i, depends on the Social Security Administration decision, SSD_t^i, Average Indexed Monthly Earnings, $AIME_t^i$, and the current year, $SSB_t^i = SSB(SSD_t^i, AIME_t^i, t)$.

Under the counterfactual partial disability insurance reform, partially disabled individuals will become eligible for partial benefits from Social Security Disability Insurance. Partially disabled individuals applying for partial SSDI benefits are assumed to experience the exact utility cost of application as the fully disabled individuals applying for full disability insurance. If an applicant's earnings exceed the Substantial Gainful Activity threshold ($1,620/month in 2025), their partial SSDI benefits are reduced accordingly. The award probability of partial disability benefits for partially disabled individuals is, on average, the same as that of full disability benefits for fully disabled individuals of the same age and education status.

6.5 Health Measures

Future health index, $H_{t+1}^i = H(D_t^i, work_t^i, I_t^i, C_t^i, H_t^i, a_{t+1}^i, e^i, \epsilon_{t+1}^{Hi})$, depends on disability status, D_t^i, employment status, $work_t^i$, health insurance coverage, I_t^i, consumption, C_t^i, health index H_t^i, age, a_{t+1}^i, college education, e^i, and health shock, $\epsilon_{t+1}^{Hi} \overset{\text{iid}}{\sim} N(0, \sigma_H^2)$, and $H(\cdot)$ — linear function. Thus,

$$
\begin{aligned}
H_{t+1}^{i} = \beta^{HC} + \beta_t^{HPFTi} 1_{D_t^i=P} \cdot 1_{work_t^i=FT} + \beta_t^{HPPTi} 1_{D_t^i=P} \cdot 1_{work_t^i=PT} + \\
+ \beta_t^{HI} I_t^i + \beta_t^{HC} C_t^i + \beta^{HP} 1_{D_t^i=P} + \beta^{HF} 1_{D_t^i=F} + \beta^{HH} H_t^i + \\
+ \beta^{HNFT} 1_{D_t^i=N} \cdot 1_{work_t^i=FT} + \beta^{HNPT} 1_{D_t^i=N} \cdot 1_{work_t^i=PT} + \beta^{HA} a_{t+1}^i + \\
+ \beta^{HE} e^i + \beta^{HFE} 1_{work_t^i=FT} \cdot e^i + \beta^{HPE} 1_{work_t^i=PT} \cdot e^i + \epsilon_{t+1}^{Hi},
\end{aligned}
$$

where β_t^{HPJi}, $J \in \{FT, PT\}$ are heterogeneous:

$$\beta_t^{HPJi} = \gamma^{HJ} + \epsilon_t^{HJi},\ \epsilon_t^{HJi} \overset{\text{iid}}{\sim} N(0, \sigma_{HJ}^2).$$

The future disability status and mortality rate, D_{t+1}^i and π_{t+1}^{mi}, depend on the same variables as H_{t+1}^i, $D_{t+1}^i = D(work_t^i, D_t^i, H_t^i, a_{t+1}^i, e^i, \epsilon_t^{DJi})$, and $\pi_{t+1}^{mi} = \pi^m(work_t^i, D_t^i, H_t^i, a_{t+1}^i, e^i, \epsilon_t^{MJi})$, but $D(\cdot)$ and $\pi^m(\cdot)$ are logistic functions. If an individual is predicted to be both fully disabled and partially disabled, full disability dominates partial disability. After individuals turn 70, t_R, they stop making decisions and are assumed not to be working. After that point, only health equations are modeled, and the mortality rate starts to depend on age quadratically.

6.6 Health Insurance

Health insurance is modeled as a dummy variable, I_t^i, representing enrollment in any health insurance before age 65 when everyone becomes eligible for Medicare. Individuals can be enrolled in private health insurance, early Medicare (through SSDI), or Medicaid. The probability of enrollment into private health insurance depends on the same variables as health measures. When individuals receive SSDI in the previous period, they automatically receive Medicare in the current period. Finally, the probability of enrollment into Medicaid depends on health measures, age, and consumption. If an individual has health insurance before 65, $I_t^i = 1$, and $I_t^i = 0$ otherwise.

6.7 Earnings and Income

Annual earnings, W_t^i, are:

$$W_t^i = \beta_W^C + \sum_{j \in \{FT,PT\}} (\beta_W^{jP} 1_{work_t^i = j} \cdot 1_{D_t^i = P} + \beta_W^{jE} 1_{work_t^i = j} \cdot e^i) +$$
$$+ \beta_W^F 1_{work_t^i = FT} + \beta_W^H H_t^i + \beta_W^A a_t^i + \epsilon_{t+1}^{Wi}.$$

The earnings depend on whether they work full-time or not, $work_t^i$, their disability status, D_t^i, health index, H_t^i, age, a_t^i, education, e^i, and earnings shock, $\epsilon_{t+1}^{Wi} \overset{\text{iid}}{\sim} N(0, \sigma_W^2)$. The income of an individual is the sum of earnings and Social Security benefits:

$$Y_t^i = W_t^i + SSB_t^i.$$

If income is lower than the annual cost of food stamps in 2018, then the income is equal to this cost.

6.8 The Maximization Problem of the Agents

The maximization problem of an individual:

$$V_t^i(\Omega_t^i;\ Z_t^i;\ \tilde{\epsilon}_t^i) = \max_{Z_t^i}(u^i(S_t^i) + \beta E(V_{t+1}^i(\Omega_{t+1}^i;\ Z_{t+1}^i;\ \tilde{\epsilon}_{t+1}^i)))$$

s.t.

$$C_t^i = Y_t^i,$$

where $\tilde{\epsilon}_{t+1}^i$ — a vector of shocks to the effects of work on the health of the partially disabled and shocks to the health index and earnings.

7 Estimation

The model parameters are estimated using the Method of Simulated Moments. This section discusses the identification of the main variables, the average marginal effect, and the model fit. 160 estimated parameters and 287 moments are reported in the online Appendix E.

7.1 Identification of the main parameters

The key parameters of the model are those driving the main results on labor supply and mortality. The work-conditional disability insurance (DI) benefits for the partially disabled will decrease the reservation wage for this group. As a result, the partially disabled will increase their labor supply. The scale of this increase will be driven by the size of the DI benefits relative to the wages of the partially disabled and their utility of leisure. The effect of partial disabilities on wages is captured by the moments related to wages for full-time and part-time workers by disability status. The utility of leisure for the partially disabled is identified based on employment rates at different ages, including 62–70, when Social Security benefits become available, and when these benefits gradually grow if an individual postpones retirement.

As for the main results on mortality, they are driven by the effects of employment, consumption, and health insurance on mortality and by the utility of leisure for the partially disabled. Partially disabled individuals in my model self-select into employment and disability benefits recipiency based on their utility of leisure and the heterogeneous effects of employment on their health. These effects are captured by the moments related to the current period mortality and disability rates and health index conditional on the previous period full-time or part-time employment, consumption, health insurance, disability and college education statuses, health index, and age, including moments capturing a jump in mortality for people retiring at 62, when Social Security benefits become available.

The credibility of the estimated parameters is checked by testing how the model fits the data (see section 7.3) and how the implied results fit the existing literature (see section 8).

7.2 Average Marginal Effects

Table 4 shows the average marginal effect of the main variables on health transition probabilities for the partially disabled. Full-time work, increases in consumption, and health insurance coverage all have negative average marginal effects on mortality and full and partial disability probabilities. Part-time work effects are more ambiguous.

The effects (β_t^{KJi}) of full-time (FT) and part-time (PT) employment on mortality probability (M), partial disability probability (P) and full disability probability (F) for the partially disabled are heterogeneous in the following way: $\beta_t^{KJi} = \gamma^{KJ} + \epsilon_t^{KJi}$, $\epsilon_t^{KJi} \overset{\text{iid}}{\sim} N(0, \sigma_{KJ}^2)$, $K \in \{M, P, F\}$, $J \in \{FT, PT\}$. Table 4 presents not only the AME of the constant component, γ^{KJ}, but also the average *absolute* marginal effect of ϵ_t^{KJi}.

The estimates of average *absolute* marginal effects of ϵ_t^{KJi} show the heterogeneity of the effects of labor supply decisions on health status transition probabilities. All partially disabled people decrease their mortality probability by working either full-time or part-time. Full-time employment also decreases disability probabilities, while part-time employment affects disability probabilities more ambiguously.

In line with existing evidence (e.g., Newhouse, 1993; Miller et al., 2024), consumption and health insurance coverage have low effects on mortality. This has consequences for the optimal modification of the SSDI program. Given these estimates, the optimal reform should motivate the partially disabled to continue working. By staying in the labor force for a longer time, the partially disabled will be less likely to die prematurely. Increasing full-time employment and health insurance coverage can also decrease disability rates.

7.3 Model fit

A model has a very good fit. Figures 2–5 show the shares of individuals satisfying the criteria outlined in each graph. Shares are calculated for individuals of each possible age.

The graphs on the left correspond to shares calculated based on the HRS data, while the graphs on the right correspond to shares estimated based on the simulated data. Figure 2 shows the average shares of partially and fully disabled individuals applying for SSDI benefits and the average shares of those who receive SSDI benefits. The fully disabled individuals are more likely to apply for SSDI benefits than the partially disabled ones in the simulated data to around the same extent as in the HRS data. Figure 3 reports the shares of people working full-time or part-time by disability status. While not disabled people are more likely to work full-time than part-time, partially disabled people are as likely to work part-time as to work full-time. Figure 4 shows the average earnings and the shares of Social Security Old-Age benefits recipients. The average earnings of the partially disabled are consistently ∼\$20,000 lower than those of the not disabled. Only when Americans start receiving old-age benefits at 62 and the massive retirement process begins will the average earnings for the not disabled become close to the earnings of the partially disabled. Finally, Figure 5 displays the shares of individuals who are partially or fully disabled and the survival rate.

8 Partial Disability Insurance Reform

I consider the following partial disability insurance reform. Under the considered reform, individuals with partial disabilities can apply for partial disability insurance (DI) benefits, provided they continue working. If the earnings of a partially disabled individual are higher than a substantial gainful activity amount (\$1,620/month in 2025), then the partial DI benefits are reduced by \$1 for each extra \$1. Unlike full DI beneficiaries, partial DI recipients do not gain early access to Medicare. However, they are covered by insurance from the onset of full disability. If a partial DI beneficiary claims they have become fully disabled, they may choose to stop working and apply for full DI benefits. During the application period, they will receive full DI benefits. If the application is approved, they continue receiving full DI benefits until the Full Retirement Age (FRA), when SSDI benefits automatically transform into Social Security Old-Age Benefits (SSOA); otherwise, benefits cease. Similar to full DI benefits, partial DI benefits are subject to an age limit — the FRA. Partial DI benefits are only available to those below the FRA. However, unlike full DI beneficiaries, partial DI recipients are not automatically transitioned to SSOA upon reaching FRA. Instead, they have the flexibility to claim SSOA at a later age. The partially disabled applying for partial DI benefits have higher chances of being awarded benefits in comparison with their peers applying for the existing SSDI benefits. The probability of a partial DI benefits award for the partially disabled is as high as the probability of the existing SSDI benefits award for the fully disabled. Moreover, partially disabled individuals applying for partial DI benefits experience the same disutility as the fully disabled experience when they are applying for the existing SSDI benefits.

Figure 6 illustrates that under the partial disability insurance reform, the partially disabled increase their labor supply. Around a 6 p.p. increase in the labor supply of the general population of Americans ages 51 to 70, both those who are not disabled and partially disabled, is in line with Yin (2015).

Figure 7 shows the increase in the share of not disabled and the survival rate. At age 60, the reduction in the share of disabled individuals is around 1 p.p, and the decrease in the annual mortality rate is approximately 0.1 p.p. The increase in the survival rate is the highest for 70-year-old Americans. Back-of-the-envelope calculations based on these percentages and based on the numbers of Americans of a given age in 2022[19] show that following the introduction of partial disability insurance benefits for the partially disabled $\sim$ 3 million Americans will postpone retirement. As a result, $40,000$ of 70-year-olds will extend their lives, and the number of 60-year-old disabled Americans will decrease by around $45,000$. The results on changes in mortality align with previous estimates of the 1 p.p. effect of retirement on mortality (Fitzpatrick and Moore, 2018).

These health improvements will come with the cost of an increase in the total sum of benefits awarded. The number of SSDI applications increases by approximately 60%. A

[19] I use US Census estimates of the population and of its age distribution

drastic increase in the number of applications will not come with a drastic increase in the program cost, as ~70% of the partially disabled who received full DI benefits will now choose partial DI benefits. Then, the amount of money spent on the benefits awarded will increase only by about 30%. Most of this increase in the program's cost is canceled by the additional taxes collected from people who increase their labor supply. After accounting for the increase in taxes (payroll taxes and income taxes), the investment necessary to prolong one person's life by one year is around $17,000. This is significantly lower than common estimates of the value of one year of life, which typically (Murphy and Topel, 2006) exceed $100,000.

It is instructive to put the results on mortality and the corresponding costs in the context of recent healthcare evolution in the US. According to Wyse and Meyer (2025), the recent Medicaid expansion saves approximately the same number of people. However, the cost of extending one person's life by one year is ~$179,000. The partial disability insurance reform considered in this paper can extend the lives of around the same number of people as the recent Medicaid expansion, but at a considerably lower cost. This cost will be below that of the plethora of existing life-saving interventions (see Figure 8).

9 Alternative Designs of Partial Disability Insurance Reform

I analyze the health effects of five alternative designs of partial disability insurance reform (see Figure 9 and Table 5). Under the primary version of the partial disability insurance reform, partial DI benefits are calculated in the same way as the existing SSDI benefits and are based on earnings history, specifically on AIME. Alternatively, partial DI benefits can constitute the taxes that working partially disabled individuals are paying. As under the primary version of the reform, the benefits are still reduced by $1 for each $1 earned above the substantial gainful activity amount ($1,620/month in 2025). The partial disability insurance reform provides labor supply incentives to those partially disabled who otherwise would stay out of the labor force due to low wages. Those partially disabled who increase their labor supply because of the reform earn little and pay little taxes. As a result, the labor supply and health effects of this version of the reform are smaller than under the primary version. However, the increase in disability insurance benefits in this case will be fully covered by the increase in taxes. This version of the reform will not only extend the lives of thousands of Americans, but also will save around \$2B.

Under the second alternative, the recipients are provided early access to Medicare. The partially disabled can have health insurance not only from the SSDI program, but they can also have private health insurance and Medicaid. With the low health effects of health insurance on mortality (see Table 4), the health improvements due to early access to Medicare relative to a primary version of the reform are small. With early access to Medicare, the cost of extending one life by one year increases to around \$59,000.

Under the third alternative, the reform does not have work requirements. The health effects of this alternative are smaller, while the number of partially disabled individuals applying for disability insurance benefits and the cost of the reform both skyrocket. The expenses necessary to prolong one person's life by one year rise to around \$61,000.

Finally, I also consider the version of the reform that eliminates any disutility from applying for disability insurance benefits and the version with the low probability of award of partial disability insurance for the partially disabled. Under the latter version, the award probability of partial disability insurance for the partially disabled is as low as the probability of the existing SSDI benefits award for the partially disabled. If partial disability insurance applicants do not experience any disutility from applying, the number of new applications for disability insurance skyrockets by 666%, and the cost of extending one person's life by one year rises to up to about \$72,000. Whereas, if the probability of the partial disability insurance award is low, the increase in the number of partially disabled individuals applying for disability insurance benefits will be low, but the increase in taxes will fully cover the increase in benefits awarded. The increase in taxes will be ∼\$25B.

10 Conclusion

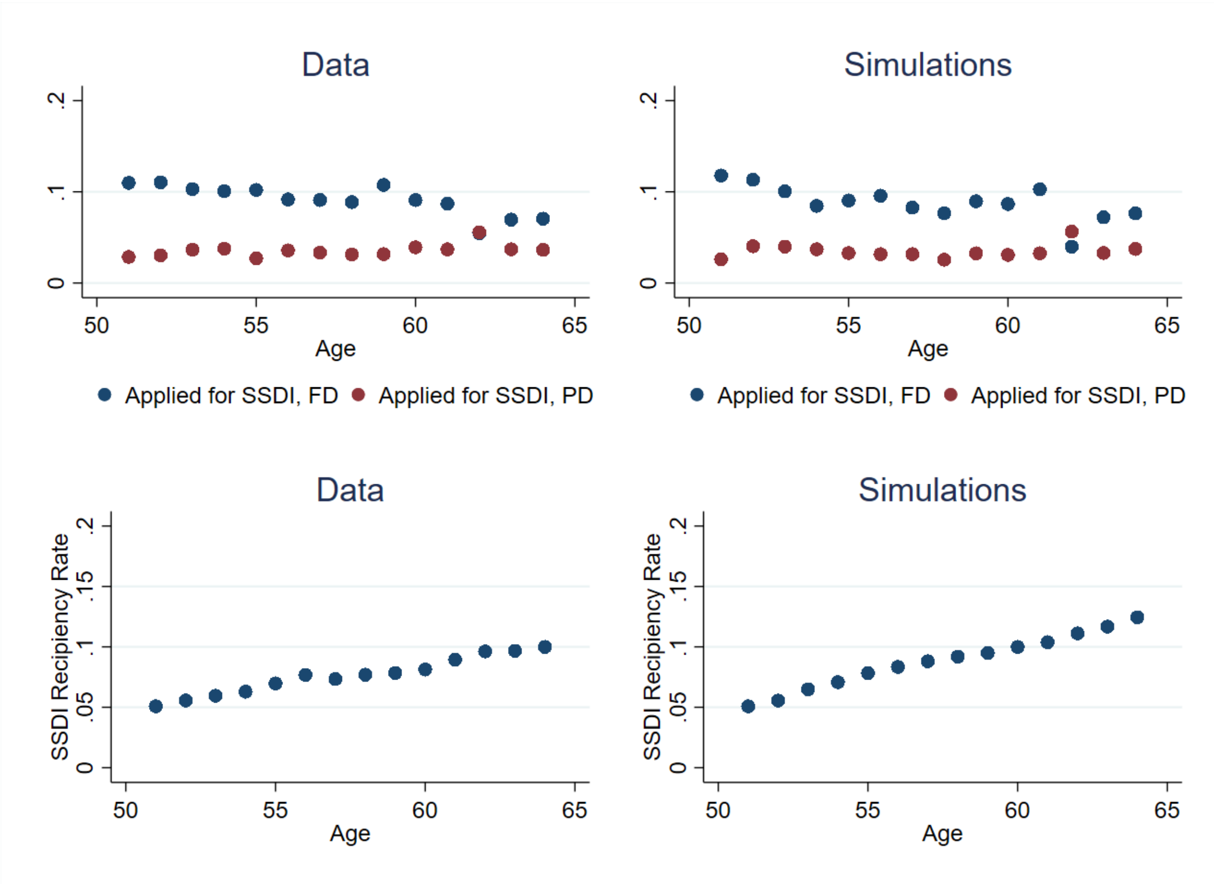
The partial disability insurance reform in the US can lead to considerable health benefits for Americans. The current SSDI program motivates partially disabled people to pretend to be fully disabled and retire earlier. If work-conditional partial disability insurance is introduced, then these people will considerably increase their labor supply and postpone retirement. As a result, the disability propensity and mortality rate will decrease. Back-of-the-envelope calculations show that ∼40,000 Americans will have longer lives. The reform will also improve the quality of life by reducing the share of disabled people by ∼1%. The number of disability insurance applications will increase by ∼60%. However, the total amount of benefits awarded to recipients will increase only by about 30%, as around 70% of the partially disabled people who applied for full benefits will choose to apply for partial ones. The increase in income and payroll taxes will cancel out most of this rise in the cost of the SSDI program. After taking an increase in taxes into account, the expenses necessary to prolong one person's life by one year are ∼$17,000. The paper considers 6 different variations of partial disability insurance reform. All of these alternatives result in the prolonged lives of a considerable number of people, with the cost of extending the life of one person by one year significantly below common valuations of one year of life and the costs of many existing life-saving interventions.

Figures

Figure 1 Retirement and 10-Year Mortality

Notes: Figure 1 shows the retirement and 10-year mortality rate by age for Health and Retirement Study (HRS) respondents between 52 and 72 years old. Two groups of HRS respondents are considered: all individuals from the estimation sample and those who have been partially disabled in the current and previous periods and did not receive SSDI. At age 62, Americans become eligible for Social Security Old Age benefits. As a result, the share of retirees jumps, and the 10-year mortality rate for individuals who have been partially disabled for two consecutive periods and did not receive SSDI rises sharply, too.

Figure 2 Model Fit: SSDI Applications and Recipiency

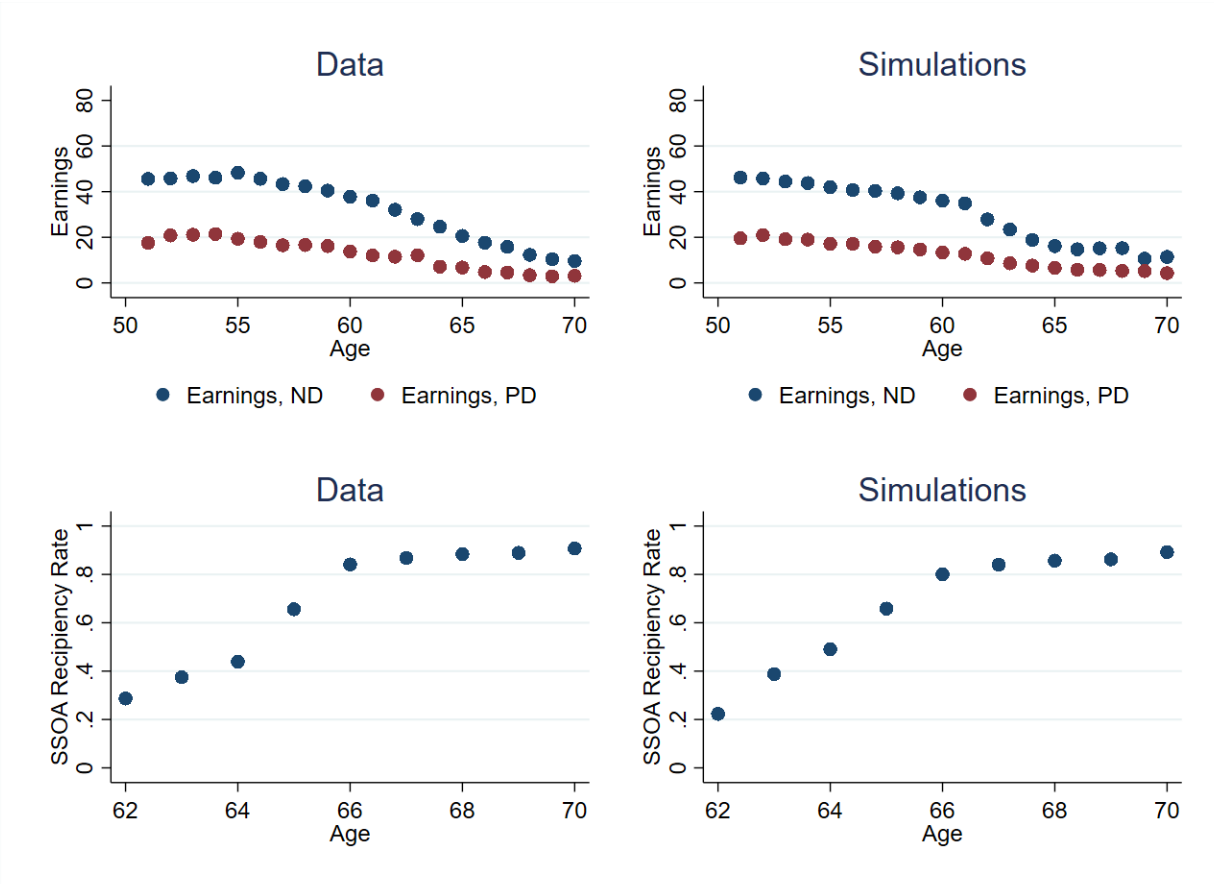


Notes: Figure 2 shows the average shares of individuals applying for SSDI or receiving SSDI at a given age in the HRS data and simulated data. "Applied for SSDI, PD" stands for the shares of individuals who applied while partially disabled, and "Applied for SSDI, FD" stands for the shares of individuals who applied while being fully disabled. For respondents in my data, Americans can apply and receive SSDI until they turn full retirement age (FRA), 65 or 66 years. After FRA, disability benefits are automatically transformed into old-age benefits.

Figure 3 Model Fit: Labor Supply Decisions

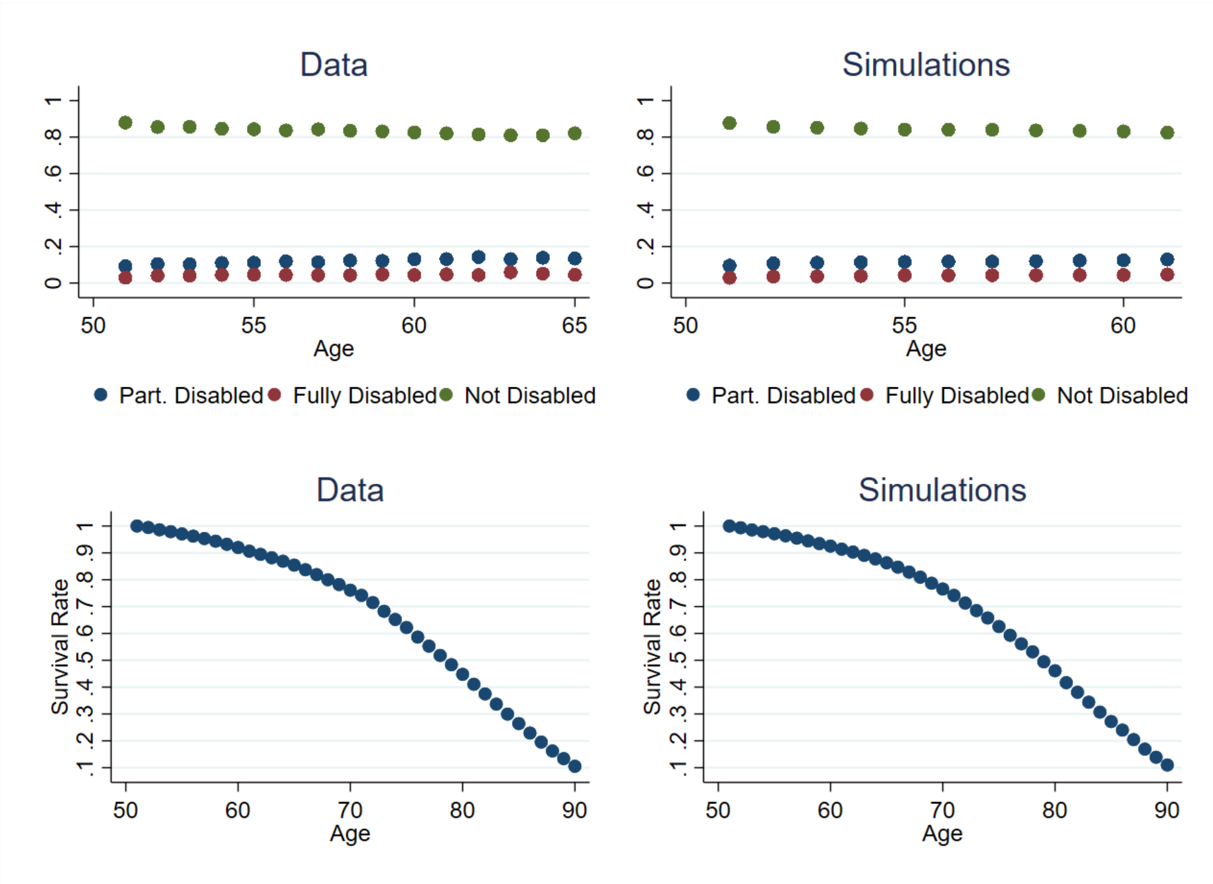
Notes: Figure 3 shows the model fit of labor supply decisions. The dots on the graphs in the first row show the average shares of not disabled (ND) individuals working full-time or part-time, while the dots on the graphs in the second row show average shares of partially disabled (PD) individuals working full-time or part-time. Individuals in the model are 51 and above and make labor supply decisions until they are 70. The graphs on the left are based on HRS Data, and the graphs on the right are based on simulated data.

Figure 4 Model Fit: Earnings and Social Security Old-Age Recipency



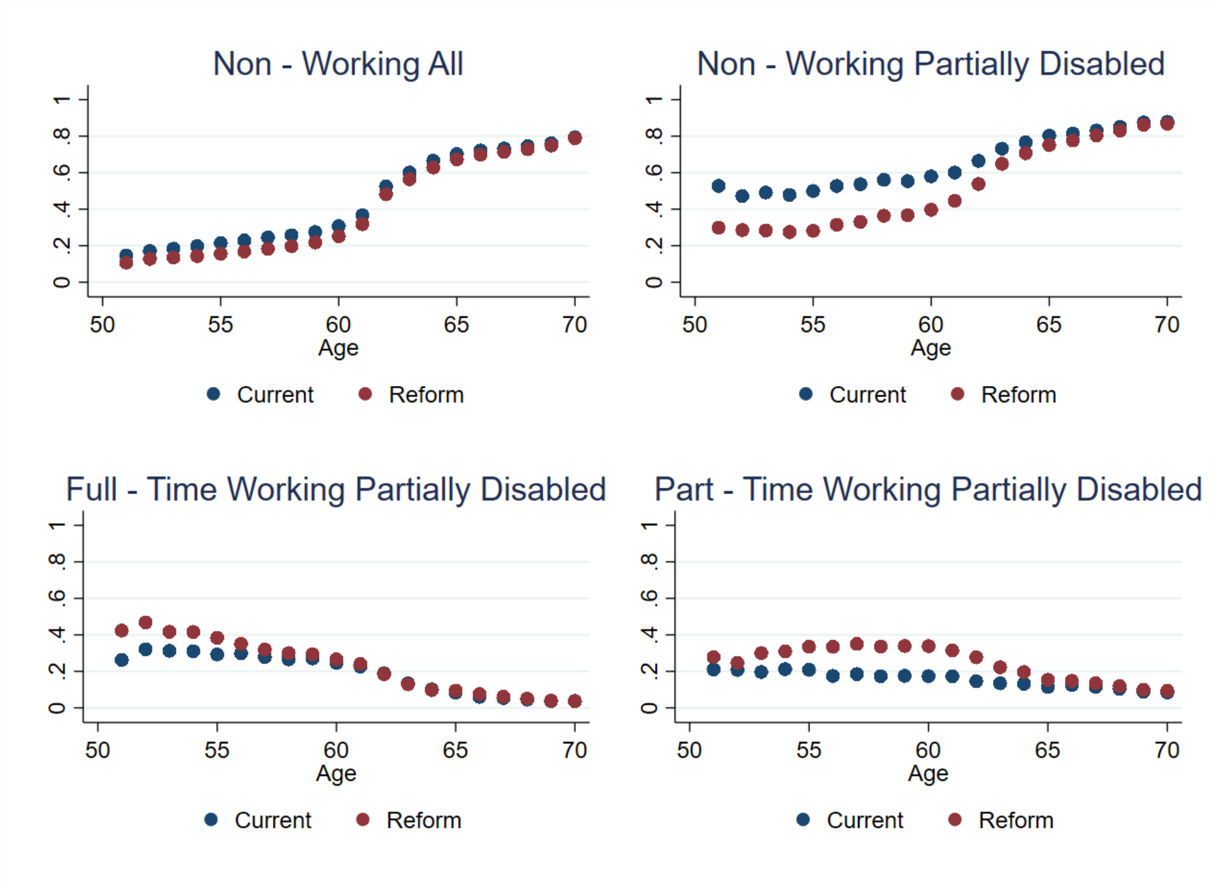
Notes: Figure 4 shows the model fit for earnings for not disabled (ND) and partially disabled (PD) people, and the Social Security Old-Age recipiency rate. The dots on the graphs in the first row show the average earnings in thousands of 2018 US dollars, while the dots on the graphs in the second row show the average shares of the individuals who have already claimed Social Security Old Age benefits. Individuals in the model are 51 and above and make labor supply decisions until they are 70. The graphs on the left are based on HRS Data, and the graphs on the right are based on simulated data.

Figure 5 Model Fit: Disability Status and Survival Rate



Notes: Figure 5 shows the model fit for disability and survival rates. The dots on the graphs in the first row show the average shares of individuals by disability status, while the dots on the graphs in the second row show the survival rate at each age. The massive retirement process that starts when individuals turn 62 affects their answers to questions about disability. As a result, for the analysis of how my model fits the data on disability rates, I focus on the shares of disabled people below 62. The graphs on the left are based on HRS Data, and the graphs on the right are based on simulated data.

Figure 6 Simulated Labor Supply under Current SSDI Policy and After Partial Disability Insurance Reform

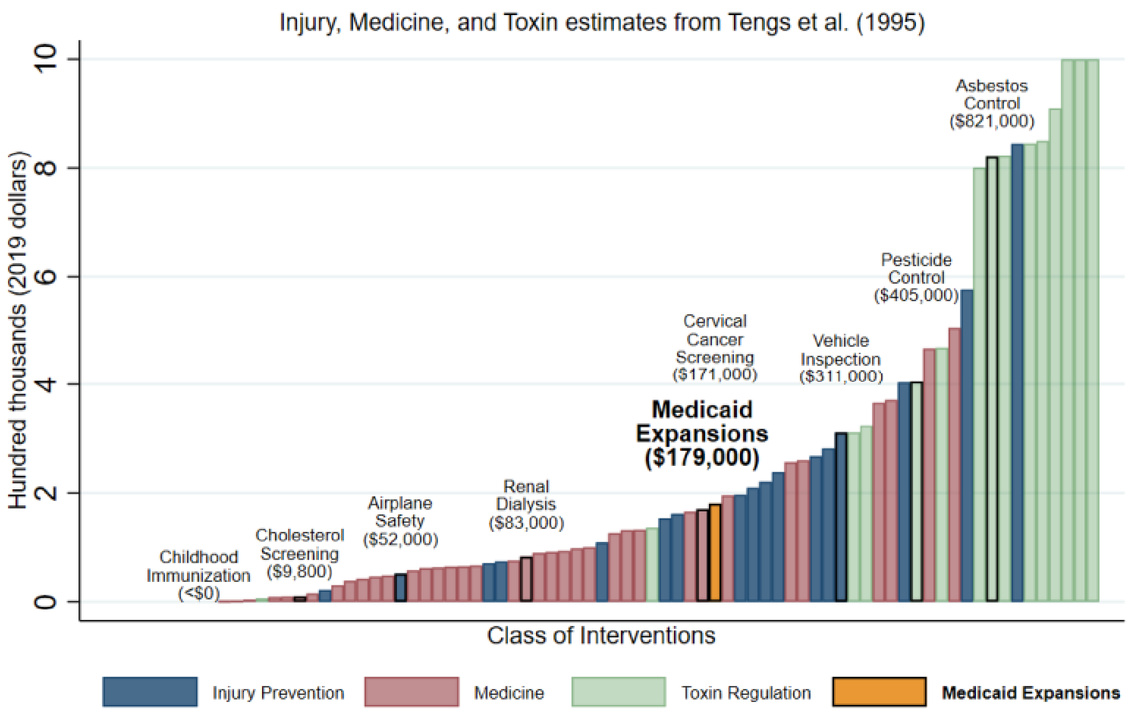


Notes: Figure 6 shows the effects of the introduction of disability insurance for the partially disabled on labor supply decisions. The dots show the shares of individuals who are not working (top left graph), the shares of partially disabled individuals who are not working (top right graph), the shares of partially disabled working part-time (bottom left graph), and the shares of partially disabled working full-time (bottom right graph). Individuals in the model are 51 and above and make labor supply decisions until 70.

Figure 7 Impact of the Partial Disability Insurance Reform on Disability Propensity and Survival

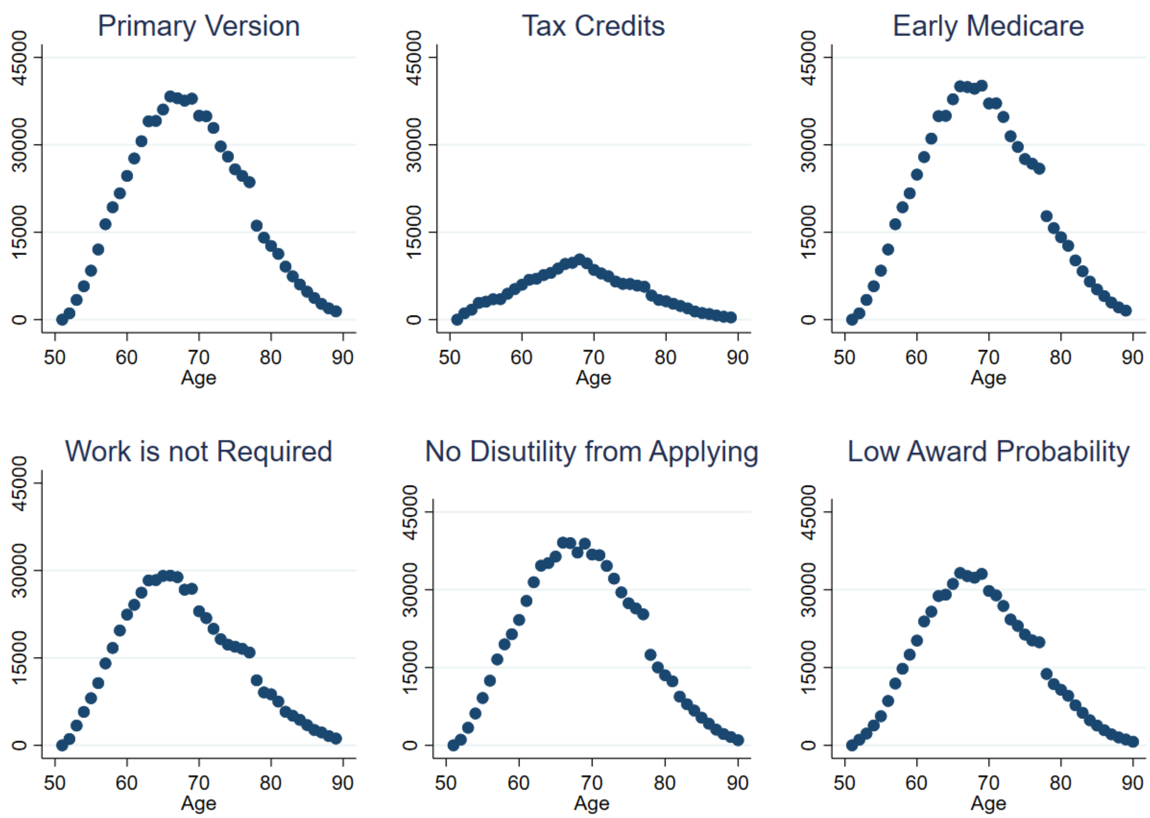
Notes: Figure 7 shows how the share and the number of disabled Americans and the survival rate will change after the introduction of partial disability insurance in the US. The dots in the graphs in the top row show increases in the shares and numbers of not disabled Americans, while the dots in the graphs in the bottom row show an increase in the survival rate and the number of lives saved. Increases in the number of not disabled Americans and the number of lives saved are estimated based on the changes in shares and the US Census estimates of the population and of its age distribution.

Figure 8 Cost-Effectiveness of Medicaid Expansions and Other Life-Saving Interventions: Average Cost Per Life-Year Saved



Notes: Figure 8 is from Wyse and Meyer (2025) and based on Tengs et al. (1995).

Figure 9 Impact of the Alternative Partial Disability Insurance Reforms on Life Longevity



Notes: Figure 9 shows the effect of alternative versions of partial disability insurance reform on life longevity. The numbers of extended lives are based on the estimated changes in survival rate and the US Census estimates of the population and of its age distribution. The primary version of the reform and the alternative versions are outlined in sections 8 and 9.

Tables

Table 1: Regression Estimates of Increase in Mortality and Retirement at Age 62

	10-Year Mortality		Retirement	
	Age^2	Age^3	Age^2	Age^3
$1_{62} * 1_{PD}$	$.046^{**}$	$.046^{**}$	$-.0017$	$-.0033$
	(.023)	(.023)	(.030)	(.030)
1_{PD}	.005	.005	$.136^{***}$	$.138^{***}$
	(.003)	(.004)	(.006)	(.006)
1_{62}	.005	.007	$.048^{***}$	$.030^{***}$
	(.004)	(.004)	(.006)	(.007)
Age	$-.054^{***}$	$-.080^{***}$	$-.090^{***}$	-1.97^{***}
	(.001)	(.011)	(.005)	(.094)
Age^2	$.001^{***}$	$.001^{***}$	$.001^{***}$	$.032^{***}$
	(.00001)	(.0001)	(.00004)	(.002)
Age^3		$-.000002^{**}$		$-.0002^{***}$
		(.000001)		(.00001)
Obs.	204,614	204,614	121,348	121,348

Notes: Table 1 shows the regression results of a regression discontinuity analysis in 10-year mortality and retirement at age 62, the minimum age for Social Security Old Age benefits. 1_{PD} stands for individuals who have been partially disabled during the current and previous periods and do not receive SSDI benefits, and 1_{62} stands for a dummy variable indicating whether a person is 62 years old or not. The sample for a regression for retirement is the estimation sample described in section 4.1, while the sample for a regression for 10-year mortality consists of observations on respondents between 51 and 90. Whereas individuals in the model make decisions between 51 and 70, mortality is followed up to 90. Robust standard errors are in parentheses. ** denotes $p < 0.05$, *** denotes $p < 0.01$. The table is based on the HRS Public Survey Data.

Table 2: Age Conditional Disability Transition Probabilities

	ND	PD	FD	Deceased
Not Disabled (ND)	0.861	0.087	0.048	0.005
Partially Disabled (PD)	0.275	0.529	0.183	0.012
Fully Disabled (FD)	0.177	0.313	0.492	0.018

Notes: Table 2 shows the health transition probability of a person whose current period's health is described in the first column and whose next period's health is described in the first row. HRS is biennial, and the period for this table is two years. The table is based on the HRS Public Survey Data for the years 1994 – 2016.

Table 3: Summary Statistics

	Full Sample	Estimation Sample
	Mean	Mean
Labor Force Status, %		
Working Full-Time	38.75	39.83
by Disability Status		
Partially Disabled	17.3	17.43
Not Disabled	49.9	49.97
Working Part-Time	15.28	15.71
by Disability Status		
Partially Disabled	14.58	15.09
Not Disabled	17.56	17.92

Table 3: Summary Statistics (Continued)

	Full Sample	Estimation Sample
	Mean	Mean
Applied,%	1.29	1.42
by Disability Status		
Partially Disabled	3.66	3.63
Fully Disabled	8.47	8.54
Receive SSDI,%	6.82	6.15
Receive SSOA,%	21.16	25.24
Disability,%		
Partially Disabled	16.35	16.21
Fully Disabled	10.27	9.74
Annual Wage	52.43	52.16
Age	60.3	60.03
College	21.26	21.96
Number of Observations	147,612	121,348

Notes: Table 3 shows the summary statistics for key variables for the estimation and full samples. The full sample consists of all observations available for respondents between 51 and 70 — the age range within which individuals make decisions in my model, and the estimation sample described in section 4.1 is also restricted to respondents within this age range. The annual wage is in thousands of 2018 US dollars, and it is the average among non-zero wages. The table is based on the HRS Public Survey Data for 1994 – 2016.

Table 4: The Effects of Employment, Consumption, and Health Insurance on Health Statuses of the Partially Disabled

	Average Marginal Effect (AME)	Absolute AME
Mortality probability		
Full time work	-2.409282	.2707464
Part time work	-1.471762	.2931913
Consumption	-.0050716	
Health insurance	-.0000634	
Partial disability proability		
Full time work	-7.127741	.5382868
Part time work	.5819776	4.622073
Consumption	-.0096583	
Health insurance	-4.510421	
Full disability probability		
Full time work	-12.41317	.3865917
Part time work	.258383	4.878659
Consumption	-.0000672	
Health insurance	-2.871482	

Notes: Table 4 shows the average marginal effects of full-time (FT) and part-time (PT) employment, consumption (C) in tens of thousands of 2018 US dollars, and health insurance (I) on mortality (M) and partial (P) and full (F) disability rates of the partially disabled. The health effects of employment are heterogeneous: $\beta_t^{KJi} = \gamma^{KJ} + \epsilon_t^{KJi}$, where $\epsilon_t^{KJi} \overset{\text{iid}}{\sim} N(0, \sigma_{KJ}^2)$, $K \in \{M, P, F\}, J \in \{FT, PT\}$. The second column shows the average marginal effects (AME), and the third column reports the absolute AME of ϵ_t^{KJi}.

Table 5: Cost and Benefits of Five Versions of SSDI Reform

Reform	People	Years	Cost	Switchers	New
Primary Version	38,296	753,594	$17K	72%	115%
Tax Credits	10,341	186,197	-	13%	37%
Early Medicare	40,147	791,644	$59K	72%	115%
Work is not Required	29,107	562,647	$61K	87%	196%
No Application Disutility	39,081	781,756	$72K	75%	666%
Low Award Probability	33,228	626,671	-	69%	38%

Notes: Table 5 shows the costs and benefits of five versions of partial disability insurance reform in the US. The primary version of the reform and the alternative versions are outlined in sections 8 and 9. The numbers in the column People show the number of people who will live longer lives thanks to the reform. The column Years presents the total number of life-years saved by the reform, the column Cost shows the cost of extending one person's life by one year, the column Switchers displays the decrease in the percentage of the partially disabled who apply for the existing SSDI benefits, and the column New shows the induced entry effect, the increase in the number of partially disabled applying for disability insurance (counterfactual partial disability insurance or existing SSDI).

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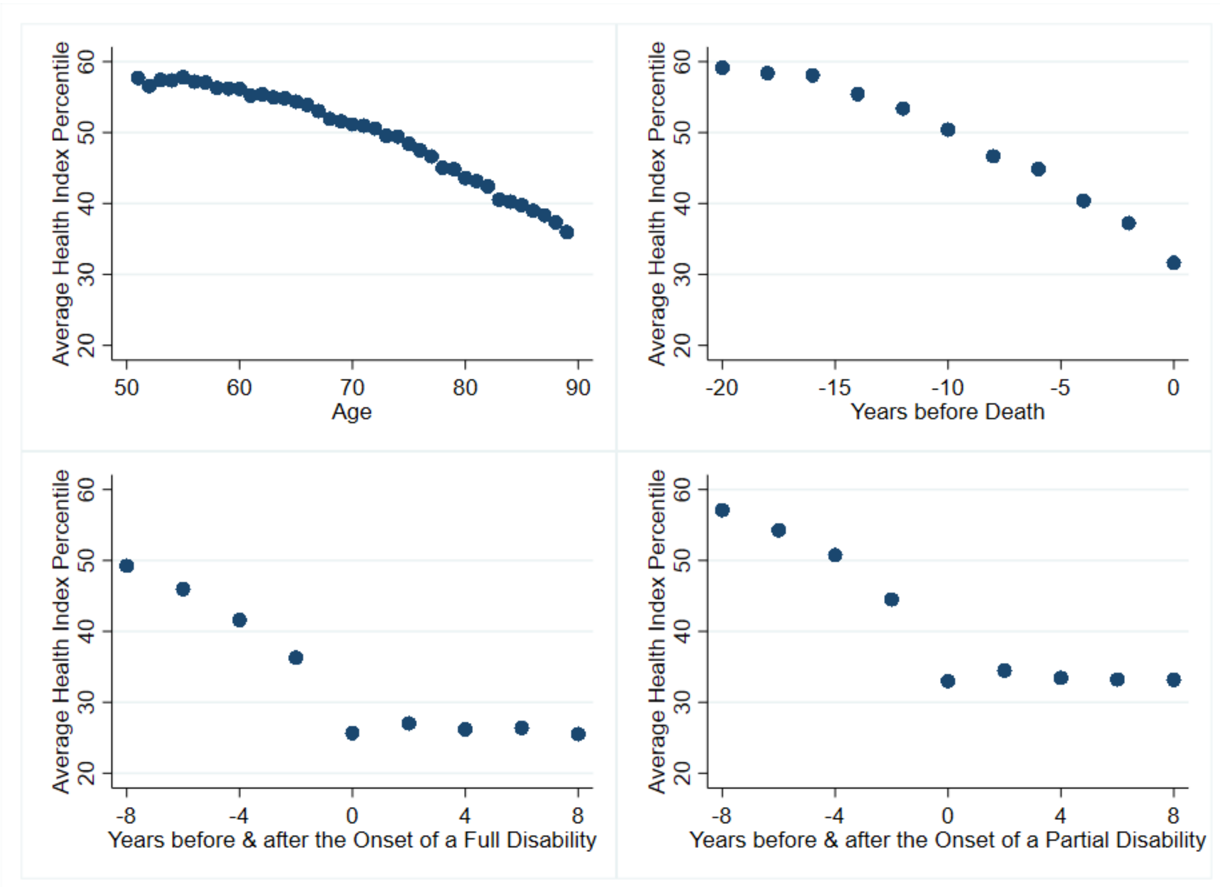
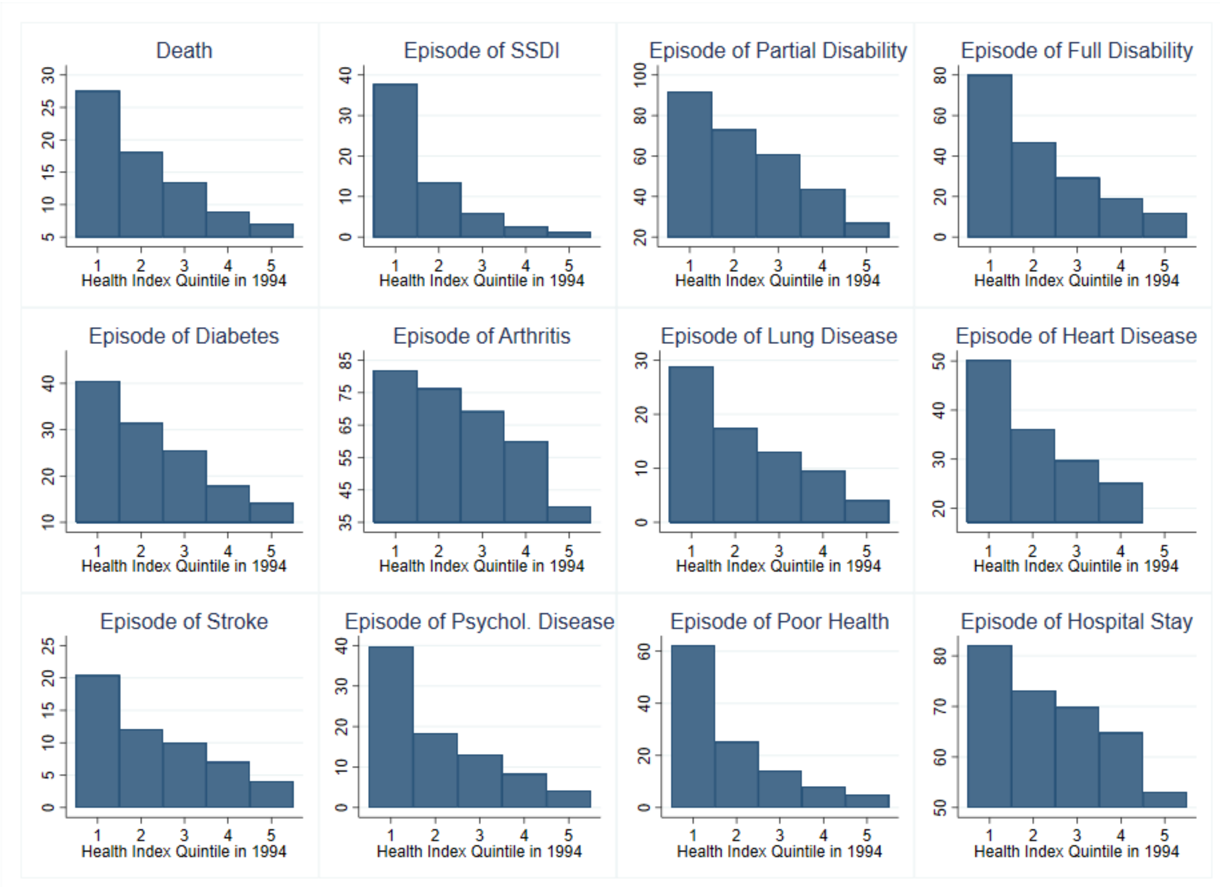
Online Appendix A. Health Index Characteristics

Figure A1 Health Index Dynamics



Notes: Figure A1 shows the dynamics of the health index over a lifetime and during the onset of partial and full disabilities. The dots show the average percentile of a health index by age or year. The graphs are based on the HRS Public Survey Data for the years between 1994 and 2016.

Figure A2 The Percentage of HRS Respondents Who Experienced Health Events by 2010 by Health Index Quintile in 1994

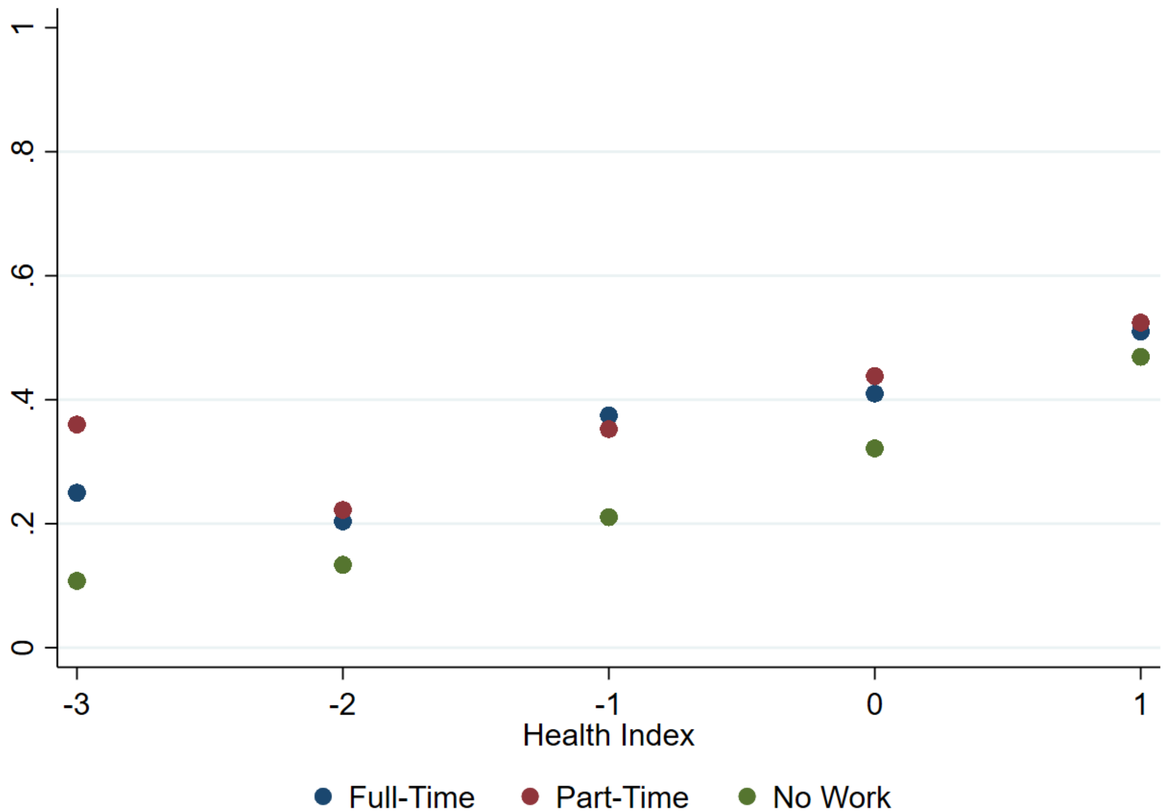


Notes: Figure A2 demonstrates the predictive power of a health index. Respondents with a lower health index in 1994 were more likely to experience negative health outcomes by 2010. The graphs are based on the HRS Public Survey Data for the years 1994–2016.

Online Appendix B. Mechanisms behind Mortality Effects of Retirement

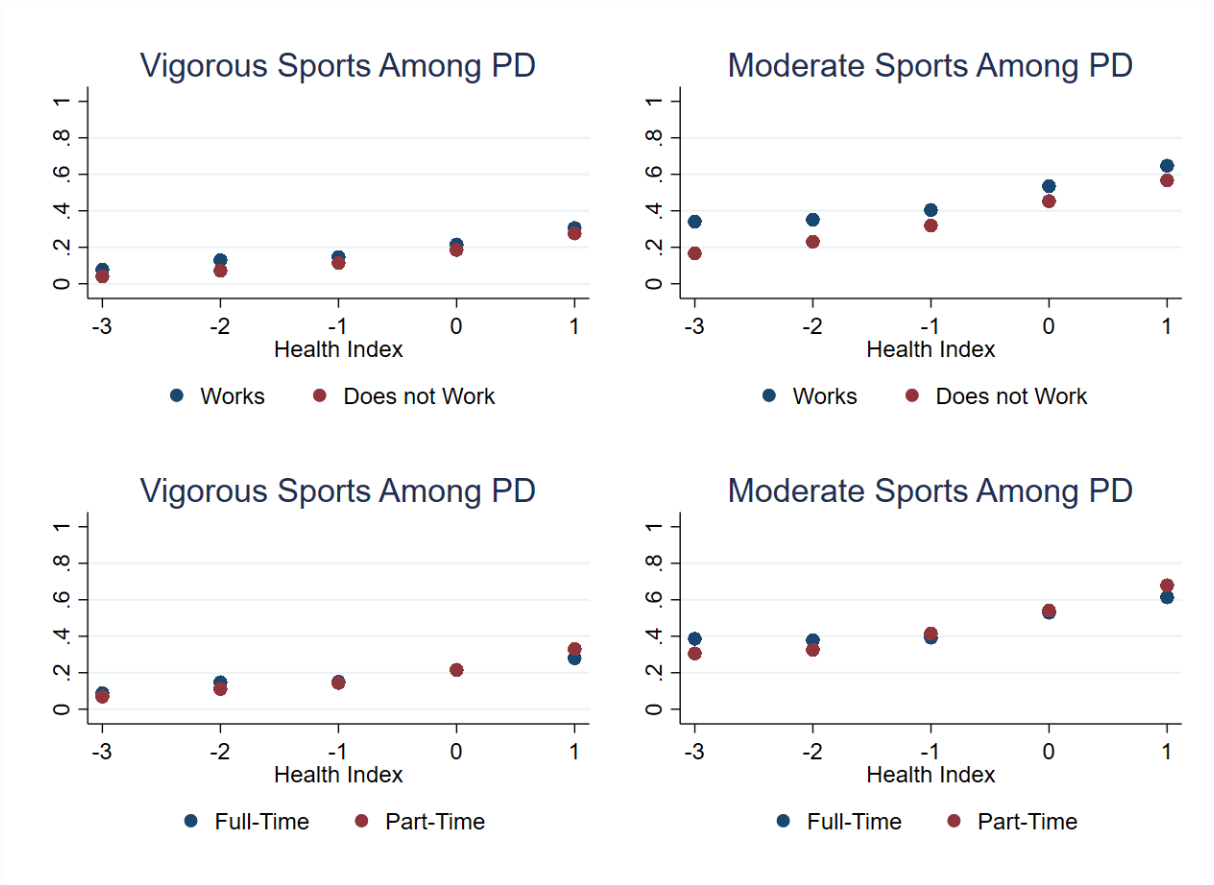
One of the reasons that existing studies (e.g., Snyder and Evans, 2006; and Fitzpatrick and Moore, 2018) cite as the cause of an increase in mortality following early retirement is the decrease in physical activity. This appendix examines how physical activity levels and health outcomes vary with different employment statuses, conditional on the health index (defined in section 4.2). For this analysis, I discretize the health index into 5 values: "-3" — around three standard deviations (s.d.) below the mean, "-2" — around two s.d. below the mean, "-1" — around one s.d. below the mean, "0" — around the mean, "1" — around one s.d. above the mean. The way questions on physical activities have been asked in the HRS data varied from wave to wave. In the waves before 2004, the questions on physical activity explicitly included work-related physical activity, while in the waves after 2004 (Figure B1), these questions instead focused on sports (Figure B2). If the questions on physical activity explicitly include work-related physical activity, then the health-conditional difference in physical activity between working and not working partially disabled is evident (Figure B1), while if the questions do not explicitly ask about work-related physical activity, the health-conditional difference in physical activity between working and not working is less pronounced but still present (Figure B2). With this more intense physical activity, working partially disabled Americans are less likely to develop high blood pressure, heart problems, stroke, and cancer (Figure B3). As a result, working partially disabled Americans are less likely to die in comparison with their non-working peers, while the mortality effects of health insurance coverage and income are noticeably lower (Figure B4).

Figure B1 Vigorous Physical Activity Including Work Among Partially Disabled by Employment Statuses and Health Index



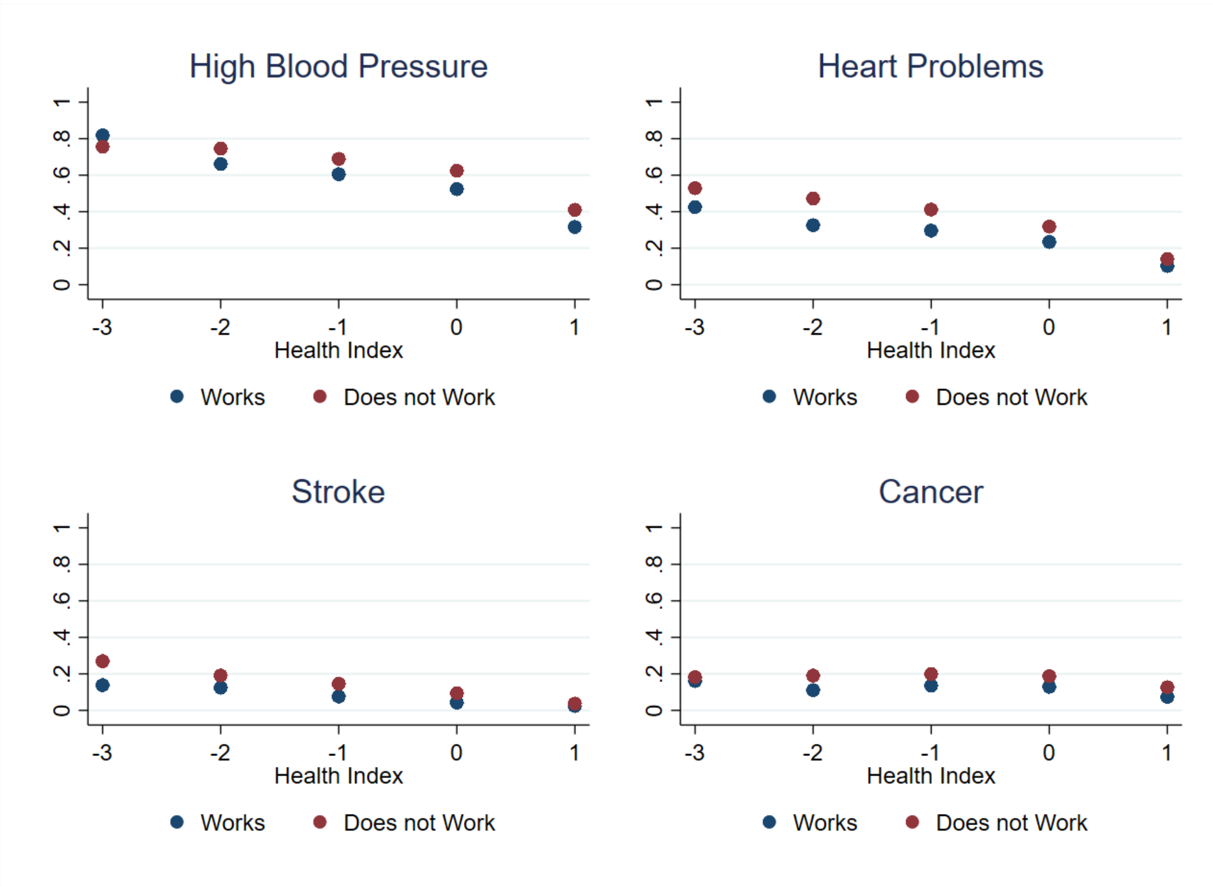
Notes: Figure B1 shows the shares of the partially disabled engaged in vigorous physical activity, including work-related vigorous physical activity, by health index. Health Index is standardized and discretized into 4 values: "-3" — around three standard deviations below the mean, "-2" — around two standard deviations below the mean, "-1" — around one standard deviation below the mean, "0" — around the mean, "1" — around one standard deviation above the mean.

Figure B2 Vigorous and Moderate Sport Activity Among Partially Disabled by Employment Statuses and Health Index



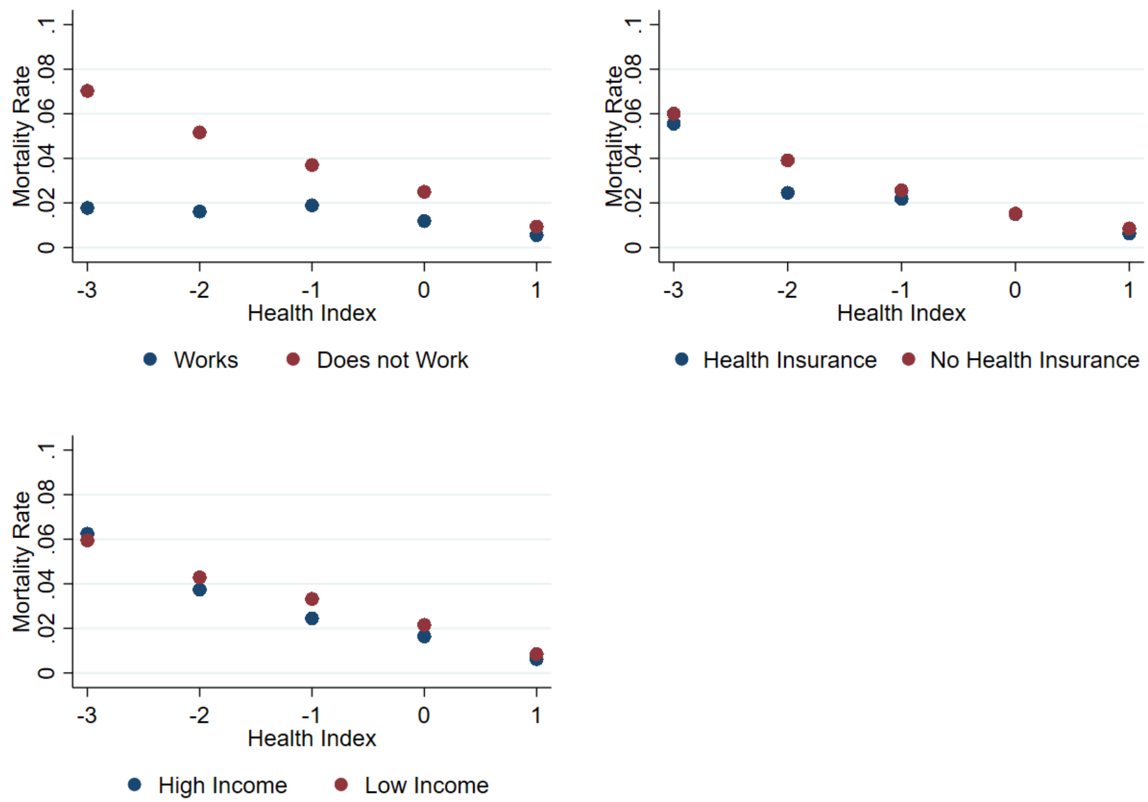
Notes: Figure B2 shows the shares of the partially disabled engaged in vigorous and moderate physical activity, by employment statuses and health index. Health Index is standardized and discretized into 4 values: "-3" — around three standard deviations below the mean, "-2" — around two standard deviations below the mean, "-1" — around one standard deviation below the mean, "0" — around the mean, "1" — around one standard deviation above the mean.

Figure B3 Health Problems of the Partially Disabled, by Employment Statuses and Health Index



Notes: Figure B3 shows the shares of the partially disabled experiencing health problems, by employment statuses and health index. Health Index is standardized and discretized into 4 values: "-3" — around three standard deviations below the mean, "-2" — around two standard deviations below the mean, "-1" — around one standard deviation below the mean, "0" — around the mean, "1" — around one standard deviation above the mean.

Figure B4 Mortality Rates of the Partially Disabled, by Employment, Health Insurance, and Income Statuses and Health Index



Notes: Figure B4 shows the mortality rate (the probability of dying in the next period) for the partially disabled, by employment, health insurance, and income ("High Income" stands for income above the median, and "Low Income" stands for income below the median) statuses, and by health index. Health Index is standardized and discretized into 4 values: "-3" — around three standard deviations (s.d.) below the mean, "-2" — around two s.d. below the mean, "-1" — around one s.d. below the mean, "0" — around the mean, "1" — around one s.d. above the mean.

Online Appendix C. Model Solution

The model solution is similar to that of Joubert and Todd (2024). Specifically, the model is solved by backward recursion. At age t_{D-1}, an individual makes optimal work and SSDI application decisions to maximize the sum of current and future period utilities, $V_{t_{D-1}}$. The expected value of $V_{t_{D-1}}$, $EV_{t_{D-1}}$, is obtained by Monte Carlo integration, i.e., by taking draws from the shock vector distribution and averaging. 10 Monte Carlo draws for health and earnings shocks are used. These calculations are performed at a set of all possible deterministic state points. Given that it is impossible to solve the problem at all continuous values of the health index and Average Indexed Monthly Earnings (AIME), I discretize the health index into 4 grid points and AIME into 4 grid points. $EV_{t_{D-1}}$ is approximated for all other state points by a polynomial regression following an approximation method developed by Keane and Wolpin (1994, 1997). The result of this approximation is denoted as $EmaxV_{t_{D-1}}$

This procedure is repeated at age t_{D-2}. Substituting the $EmaxV_{t_{D-1}}$ for the future component $EV_{t_{D-1}}$, the optimal decision is made. Monte Carlo integration over the shock vector at t_{D-2} provides $EV_{t_{D-2}}$ for a given deterministic state point. A polynomial regression over a subset of the state points again provides an approximation to $EV_{t_{D-2}}$, denoted by $EmaxV_{t_{D-1}}$. Repeating the procedure back to the initial age provides the approximation at each age. The set of $EmaxV_t$ is the solution to the optimization problem.

Online Appendix D. Utility Function

The per-period utility function of an agent, $u_t^i(\cdot)$, has the following form:

$$u_t^i(S_t^i) = ln(C_t^i)\Big(1 + \sum_{j\in\{P,N\}} (\alpha_L^j 1_{work_t^i=j} + \alpha_L^{jH} 1_{work_t^i=j}\tilde{H}_t^i)+$$

$$+ \sum_{j\in\{F,P\}} (\alpha_W^j 1_{work_t^i=j} 1_{D_t^i=P} + \alpha_W^{jH} 1_{work_t^i=j} 1_{D_t^i=P}\hat{H}_t^i)+$$

$$+ \sum_{j\in\{F,P,N\}} (\alpha_O^j start_t^i 1_{D_t^i=j} + \alpha_O^{jH} start_t^i 1_{D_t^i=j}\tilde{H}_t^i)\Big)+$$

$$+ \sum_{j\in\{F,P\}} (\alpha_R^j 1_{work_t^i=j} 1_{work_{t-1}^i=N} + \alpha_R^{jH} 1_{work_t^i=j} 1_{work_{t-1}^i=N}\hat{H}_t^i)+$$

$$+ \sum_{j\in\{P,N\}} (\alpha_{PF}^j 1_{work_t^i=F} 1_{work_{t-1}^i=P} + \alpha_{FP}^j 1_{work_t^i=P} 1_{work_{t-1}^i=F}) 1_{D_t^i=j}+$$

$$+ \sum_{k\in\{NA,t,t-1,t-2\},\ j\in\{P,F\}} (\alpha_k^j + \alpha_k^{jH} 1_{D_t^i=j}\tilde{H}_t^i) 1_{apply_t^i=FD} 1_{SSOA_t^i=k}.$$

The utility derived from consumption varies with employment, disability, and Social Security Old-Age benefits statuses, $work_t^i$, D_t^i, $start_t^i$, and the health index, H_t^i. The health index is transformed in such a way that everyone receives utility benefits from leisure and disutility from Social Security benefits applications and from working while disabled. Those with a higher health index receive higher utility benefits from leisure, higher utility costs from the Social Security applications, and lower utility costs from working while partially disabled: $\tilde{H}_t^i = |max(H_t^i)| + H_t^i$, $\hat{H}_t^i = |min(H_t^i)| - H_t^i$. Agents also bear utility costs from returning to part-time or full-time work after not working, switching employment statuses, and applying for Social Security benefits. Individuals make decisions while they are between 51, t_{min}, and 70, t_R. To account for all unobserved factors preceding the initial period, the utility of individuals in this initial period is adjusted by:

$$\tilde{u}_{t_{min}}^i(S_{t_{min}}^i) = \alpha_{t_{min}}^{FP} 1_{work_t^i=F} 1_{D_t^i=P} + \alpha_{t_{min}}^{PP} 1_{work_t^i=P} 1_{D_t^i=P}+$$

$$+\alpha^{AP}_{t_{min}} 1_{apply^i_t=F} 1_{D^i_t=P} \tilde{H}^i_t + \alpha^{AF}_{t_{min}} 1_{apply^i_t=F} 1_{D^i_t=F} \tilde{H}^i_t.$$

When individuals turn 70, t_R, they additionally receive the utility:

$$\tilde{u}^i_R(S^i_R) = \alpha^R_R 1_{SSD^i_t=OA} + \alpha^{RP}_R 1_{SSD^i_t=OA} 1_{D^i_t=P} + \alpha^{RF}_R 1_{SSD^i_t=OA} 1_{D^i_t=F} +$$

$$+\alpha^A_R 1_{apply^i_t=OA} + \alpha^{AP}_R 1_{apply^i_t=OA} 1_{D^i_t=P} + \alpha^{AF}_R 1_{apply^i_t=OA} 1_{D^i_t=F}.$$

If individuals die before 70, they receive terminal value, $\alpha_{terminal}$.

Online Appendix E. Parameter Estimates and Moments

Table E1: Parameter Estimates

Name	Symbol	Estimate
Discount Factor	β	0.98
Utility of		
PT leisure, constant	α_L^P	0.19
PT leisure, health index coefficient	α_L^{PH}	0.23
FT leisure, constant	α_L^F	0.21
FT leisure, health index coefficient	α_L^{FH}	0.35
FT work while PD, constant	α_W^F	-0.00008
FT work while PD, health index coefficient	α_W^{FH}	-0.00010
PT work while PD, constant	α_W^P	-0.00280
PT work while PD, health index coefficient	α_W^{PH}	-0.01007
Utility of applying for SSOA		
For ND, constant	α_O^N	-.635
For ND, health index coefficient	α_O^{NH}	-.403
For PD, constant	α_O^P	-.003
For PD, health index coefficient	α_O^{PH}	-.429
For FD, constant	α_O^F	-.620
For FD, health index coefficient	α_O^{FH}	-.256
Utility of Returning		
To FT work, constant	α_R^F	-11.50
To FT work, health index coefficient	α_R^{FH}	-43.00
To PT work, constant	α_R^P	-15.90
To PT work, health index coefficient	α_R^{PH}	-27.93

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Utility of Switching		
To FT work for ND	α_N^{PF}	0.34
To PT work for ND	α_N^{FP}	-1.50
To FT work for PD	α_P^{PF}	-0.00199
To PT work for PD	α_P^{FP}	-0.00078
Utility of applying for SSDI before SSOA recipiency for		
For PD, constant	α_{NA}^{P}	-1.83
For PD, health index coefficient	α_{NA}^{PH}	-0.20
For FD, constant	α_{NA}^{F}	-0.70
For FD, health index coefficient	α_{NA}^{FH}	-0.32
Utility of applying for SSDI during the 1st period of SSOA		
For PD, constant	α_t^{P}	-0.29
For PD, health index coefficient	α_t^{PH}	-0.12
For FD, constant	α_t^{F}	-0.07
For FD, health index coefficient	α_t^{FH}	-1.15
Utility of applying for SSDI during the 2st period of SSOA		
For PD, constant	α_{t-1}^{P}	-0.82
For PD, health index coefficient	α_{t-1}^{PH}	-0.89
For FD, constant	α_{t-1}^{F}	-0.56
For FD, health index coefficient	α_{t-1}^{FH}	-0.35

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Utility of applying for SSDI during the 3rd period of SSOA		
For PD, constant	α_{t-2}^{P}	-1.15
For PD, health index coefficient	α_{t-2}^{PH}	-0.11
For FD, constant	α_{t-2}^{F}	-0.50
For FD, health index coefficient	α_{t-2}^{FH}	-6.15
Mortality rate logit regression		
Constant	β^{MC}	-7.700000
Full-time	β^{MFT}	-0.000200
Part-time	β^{MPT}	-0.005090
Fully disabled	β^{MF}	1.482000
Partially disabled	β^{MP}	1.824254
Health Index	β^{MH}	-0.017620
Age	β^{MA}	0.044584
Education	β^{ME}	-0.019000
Full-time work for PD	γ^{MFT}	-1.710000
Part-time work for PD	γ^{MPT}	-1.039622
Full-time work for college educated	β^{MFTE}	-0.000005
Part-time work for college educated	β^{MPTE}	-0.000003
Consumption in thousands of dollars	β^{MC}	-0.000360
Health insurance	β^{MI}	-0.000045
S.D. of full-time work effects for PD	σ_{MFT}	0.240625
S.D. of part-time work effects for PD	σ_{MPT}	0.260313
Quadratic age coefficient when age ≥ 70	$\beta^{MA_{squared}}$	0.00290

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Partial disability rate logit regression		
Constant	β^{PC}	-2.5840220
Full-time	β^{PFT}	-0.7385721
Part-time	β^{PPT}	-2.0265713
Fully disabled	β^{PF}	0.0003600
Partially disabled	β^{PP}	2.6938740
Health Index	β^{PH}	-0.9987486
Age	β^{PA}	0.0194382
Education	β^{PE}	0.0440154
Full-time work for PD	γ^{PFT}	0.0005800
Part-time work for PD	γ^{PPT}	2.0868281
Full-time work for college educated	β^{PFTE}	0.0485781
Part-time work for college educated	β^{PPTE}	0.0000003
Consumption in thousands of dollars	β^{PC}	-0.0001000
Health insurance	β^{PI}	-0.4670000
S.D. of full-time work effects for PD	σ_{PFT}	0.1150000
S.D. of part-time work effects for PD	σ_{PPT}	1.4431250

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Full disability rate logit regression		
Constant	β^{FC}	-3.101202
Full-time	β^{FFT}	-2.955109
Part-time	β^{FPT}	0.066250
Fully disabled	β^{FF}	3.885498
Partially disabled	β^{FP}	0.001610
Health Index	β^{FH}	-0.488417
Age	β^{FA}	0.009990
Education	β^{FE}	-1.700000
Full-time work for PD	γ^{FFT}	-0.000901
Part-time work for PD	γ^{FPT}	-0.004720
Full-time work for college educated	β^{FFTE}	0.246613
Part-time work for college educated	β^{FPTE}	0.000120
Consumption in thousands of dollars	β^{FC}	-0.000002
Health insurance	β^{FI}	-0.683800
S.D. of full-time work effects for PD	σ_{FFT}	0.070000
S.D. of part-time work effects for PD	σ_{FPT}	0.600625

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Health index regression		
Constant	β^{HC}	0.2045000
Full-time	β^{HFT}	-.0555000
Part-time	β^{HPT}	0.0020000
Fully disabled	β^{HF}	-.6350000
Partially disabled	β^{HP}	-.4000000
Health Index	β^{HH}	0.7700000
Age	β^{HA}	-.0010700
Education	β^{HE}	0.1761300
Full-time work for PD	β^{HFTP}	-.1564000
Part-time work for PD	β^{HPTP}	-.0904900
Full-time work for college educated	β^{HFTE}	0.0000840
Part-time work for college educated	β^{HPTE}	-.4008460
Consumption in thousands of dollar	β^{HC}	0.0000009
Health insurance	β^{HI}	0.0538000
S.D. of full-time work effects for PD	σ_{HFT}	0.000500
S.D. of part-time work effects for PD	σ_{HPT}	0.046000
Health index shock	σ_H^2	0.00010

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
SSDI award probability logit regression		
Constant	β_R^C	-10.62500
Fully disabled	β_R^F	0.23
Health Index	β_R^H	-11.08
Age	β_R^A	0.00
Education	β_R^E	-0.00
Age $\geq$ 59	$\beta_R^{Age_{59}}$	1.34
Age $\geq$ 60	$\beta_R^{Age_{60}}$	1.14
Age $\geq$ 61	$\beta_R^{Age_{61}}$	3.40
Age $\geq$ 62	$\beta_R^{Age_{62}}$	0.20
Age $\geq$ 63	$\beta_R^{Age_{63}}$	0.12
Age $\geq$ 64	$\beta_R^{Age_{64}}$	0.02
Earnings regression, Thousands of 2018 US Dollars		
Constant	β_W^C	10.54443
Full-time work	β_W^F	61.75616
Health Index	β_W^H	0.03600
Age	β_W^A	-0.57952
Part-time work for PD	β_W^{PP}	-15.57655
Full-time work for PD	β_W^{FP}	-0.21405
Part-time work for college-educated	β_W^{PC}	63.10165
Full-time work for college-educated	β_W^{FC}	29.82717
Earnings shock	σ_W^2	28.01800

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
Private health insurance logit regression		
Constant	β_{PH}	-2.621
Full-time	β_{PH}^{FT}	2.393
Part-time	β_{PH}^{PT}	1.267
Fully disabled	β_{PH}^{F}	-0.310
Partially disabled	β_{PH}^{P}	0.782
Health Index	β_{PH}^{H}	0.067
Age	β_{PH}^{A}	0.035
Education	β_{PH}^{E}	0.394
Full-time work for PD	β_{PH}^{FP}	-1.480
Part-time work fo PD	β_{PH}^{PP}	-1.260
Full-time work for college educated	β_{PH}^{FE}	0.120
Part-time work for college educated	β_{PH}^{PE}	0.011
Consumption	β_{PH}^{C}	0.003
Medicaid logit regression		
Constant	β_{MC}	-4.40000
Health Index	β_{MC}^{H}	-0.00034
Age	β_{MC}^{A}	0.03422
Education	β_{MC}^{E}	-1.55500
Consumption	β_{MC}^{C}	-0.00002

Table E1: Parameter Estimates (Continued)

Name	Symbol	Estimate
First decision-making period utility of		
Working full-time	α_{FF}	-0.52
First period utility of working part-time	α_{FF}	-1.23
Working full-time for PD	α_{FF}	-2.01
Working part-time for PD	α_{FF}	-0.60
Applying for SSDI fo PD	α_{FF}	-1.10
Applying for SSDI for FD	α_{FF}	-0.18
Retirement period utility of		
Working full-time	α_{BF}	2.20000
Working part-time	α_{BP}	2.10625
Working full-time for PD	α_{BFP}	4.00000
Working part-time for PD	α_{BPP}	1.01500
Not receiving SSOA	α_{BF}	0.18000
Not receiving SSOA for PD	α_{BF}	-1.70250
Not receiving SSOA for FD	α_{BF}	-0.22360
Not starting SSOA	α_{BF}	-0.00278
Not starting SSOA for PD	α_{BF}	-56.53750
Not starting SSOA for FD	α_{BF}	37.79002
Terminal value	α_{T}	-0.23

Notes: Table E1 shows the model parameter estimates. In total, the model has 160 parameters described in section 6. PT stands for part-time, FT — for full-time, PD — for the partially disabled, ND — for the not disabled, and FD — for the fully disabled. Consumption is in thousands of 2018 US dollars. Age dummies in the SSDI award logit regression represent special rules for applicants close to retirement age.

Table E2: List of Moments

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
FT	51		-	-				0.689	0.745	0.214
FT	52		-	-				0.683	0.757	0.217
FT	53		-	-				0.694	0.749	0.212
FT	54		-	-				0.680	0.739	0.217
FT	55		-	-				0.687	0.715	0.215
FT	56		-	-				0.664	0.692	0.223
FT	57		-	-				0.649	0.687	0.228
FT	58		-	-				0.634	0.689	0.232
FT	59		-	-				0.601	0.660	0.240
FT	60		-	-				0.554	0.636	0.247
FT	61		-	-				0.524	0.593	0.249
FT	62		-	-				0.420	0.416	0.244
FT	63		-	-				0.357	0.332	0.230
FT	64		-	-				0.330	0.239	0.221
FT	65		-	-				0.255	0.189	0.190
FT	66		-	-				0.223	0.159	0.173
FT	67		-	-				0.194	0.159	0.156
FT	68		-	-				0.149	0.149	0.127
FT	69		-	-				0.138	0.098	0.119
FT	70		-	-				0.123	0.117	0.108

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
FT	51		+	-				0.247	0.262	0.186
FT	52		+	-				0.312	0.321	0.215
FT	53		+	-				0.327	0.313	0.220
FT	54		+	-				0.354	0.310	0.229
FT	55		+	-				0.328	0.292	0.221
FT	56		+	-				0.340	0.298	0.225
FT	57		+	-				0.263	0.278	0.194
FT	58		+	-				0.297	0.266	0.209
FT	59		+	-				0.264	0.271	0.195
FT	60		+	-				0.222	0.246	0.173
FT	61		+	-				0.201	0.227	0.161
FT	62		+	-				0.163	0.190	0.137
FT	63		+	-				0.130	0.134	0.113
FT	64		+	-				0.104	0.101	0.093
FT	65		+	-				0.082	0.083	0.076
FT	66		+	-				0.062	0.060	0.058
FT	67–68		+	-				0.048	0.049	0.046
FT	69		+	-				0.034	0.037	0.032
FT	70		+	-				0.040	0.036	0.038
PT	51–52		-	-				0.152	0.200	0.129
PT	53		-	-				0.148	0.190	0.126
PT	54		-	-				0.153	0.186	0.130
PT	55		-	-				0.148	0.200	0.126

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
PT	56		-	-				0.153	0.209	0.130
PT	57		-	-				0.163	0.196	0.136
PT	58		-	-				0.160	0.186	0.135
PT	59		-	-				0.174	0.193	0.144
PT	60		-	-				0.176	0.182	0.145
PT	61		-	-				0.179	0.156	0.147
PT	62		-	-				0.196	0.146	0.158
PT	63		-	-				0.218	0.151	0.171
PT	64		-	-				0.202	0.172	0.161
PT	65		-	-				0.217	0.189	0.170
PT	66		-	-				0.213	0.218	0.167
PT	67		-	-				0.225	0.226	0.174
PT	68		-	-				0.222	0.240	0.173
PT	69		-	-				0.212	0.292	0.167
PT	70		-	-				0.207	0.226	0.164
PT	51		+	-				0.208	0.210	0.165
PT	52		+	-				0.214	0.208	0.168
PT	53		+	-				0.196	0.196	0.158
PT	54		+	-				0.191	0.212	0.155
PT	55		+	-				0.216	0.208	0.170

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
PT	56		+	-				0.182	0.175	0.149
PT	57		+	-				0.167	0.185	0.139
PT	58		+	-				0.186	0.174	0.152
PT	59		+	-				0.151	0.175	0.128
PT	60		+	-				0.177	0.174	0.146
PT	61		+	-				0.161	0.173	0.135
PT	62		+	-				0.143	0.146	0.122
PT	63		+	-				0.145	0.134	0.124
PT	64		+	-				0.146	0.132	0.124
PT	65		+	-				0.131	0.114	0.114
PT	66		+	-				0.129	0.125	0.112
PT	67–68		+	-				0.110	0.109	0.098
PT	69		+	-				0.106	0.089	0.095
PT	70		+	-				0.092	0.085	0.084
App.	51		+	-				0.029	0.026	0.028
App.	52		+	-				0.030	0.040	0.029
App.	53		+	-				0.036	0.040	0.035
App.	54		+	-				0.038	0.037	0.036
App.	55		+	-				0.027	0.033	0.026

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
App.	56		+	-				0.036	0.032	0.035
App.	57		+	-				0.033	0.032	0.032
App.	58		+	-				0.031	0.026	0.030
App.	59		+	-				0.032	0.033	0.031
App.	60		+	-				0.039	0.031	0.038
App.	61		+	-				0.037	0.033	0.036
App.	62		+	-				0.056	0.056	0.053
App.	63		+	-				0.037	0.033	0.036
App.	64		+	-				0.036	0.037	0.035
App.	51		-	+				0.110	0.118	0.098
App.	52		-	+				0.110	0.113	0.098
App.	53		-	+				0.103	0.101	0.093
App.	54		-	+				0.101	0.085	0.091
App.	55		-	+				0.102	0.090	0.092
App.	56		-	+				0.092	0.096	0.083
App.	57		-	+				0.091	0.083	0.083
App.	58		-	+				0.089	0.076	0.081
App.	59		-	+				0.108	0.090	0.096
App.	60		-	+				0.091	0.087	0.083
App.	61		-	+				0.087	0.103	0.079
App.	62		-	+				0.055	0.040	0.052
App.	63		-	+				0.069	0.072	0.065
App.	64		-	+				0.070	0.076	0.066

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
SSOA	62							0.287	0.223	0.205
SSOA	63							0.375	0.388	0.234
SSOA	64							0.439	0.490	0.246
SSOA	65							0.656	0.658	0.226
SSOA	66							0.841	0.801	0.133
SSOA	67							0.868	0.840	0.115
SSOA	68							0.884	0.857	0.103
SSOA	69							0.889	0.862	0.099
SSOA	70							0.907	0.893	0.084
SSDI	51							0.051	0.051	0.051
SSDI	52							0.056	0.056	0.051
SSDI	53							0.060	0.065	0.058
SSDI	54							0.063	0.071	0.058
SSDI	55							0.070	0.078	0.065
SSDI	56							0.077	0.083	0.071
SSDI	57							0.073	0.088	0.068
SSDI	58							0.077	0.092	0.071
SSDI	59							0.078	0.095	0.072
SSDI	60							0.081	0.100	0.075
SSDI	61							0.089	0.104	0.081
SSDI	62							0.096	0.111	0.087
SSDI	63							0.097	0.117	0.087

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
SSDI	64							0.100	0.124	0.090
SSDI	<65		-	+				0.544	0.625	0.248
SSDI	<65				-			0.091	0.111	0.083
SSDI	<65				-			0.028	0.030	0.027
PD	51							0.092	0.095	0.083
PD	52							0.104	0.108	0.093
PD	53							0.103	0.111	0.092
PD	54							0.110	0.114	0.098
PD	55							0.112	0.116	0.099
PD	56							0.119	0.117	0.105
PD	57							0.114	0.118	0.101
PD	58							0.123	0.120	0.108
PD	59							0.121	0.123	0.107
PD	60							0.131	0.125	0.114
PD	61							0.132	0.129	0.114
PD	62							0.142	0.116	0.122
PD	63							0.131	0.100	0.114
PD	64							0.138	0.114	0.119

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
PD	<65	-	-	-				0.149	0.176	0.127
PD	<65	PT	-	-				0.091	0.039	0.083
PD	<65	FT	-	-				0.067	0.066	0.063
PD	<65	-	+	-				0.521	0.579	0.250
PD	<65	PT	+	-				0.530	0.505	0.249
PD	<65	FT	+	-				0.422	0.470	0.244
PD	<65	-			-			0.234	0.265	0.179
PD	<65	PT			-			0.158	0.134	0.133
PD	<65	FT			-			0.100	0.098	0.090
PD	<65	-			+			0.180	0.186	0.148
PD	<65	PT			+			0.115	0.063	0.102
PD	<65	FT			+			0.062	0.073	0.058
PD	<65					<20		0.221	0.238	0.172
PD	<65					>20		0.115	0.095	0.101
PD	<65						-	0.178	0.176	0.146
PD	<65						+	0.121	0.102	0.106
FD	51							0.029	0.028	0.028
FD	52							0.041	0.036	0.039
FD	53							0.040	0.037	0.039
FD	54							0.045	0.039	0.043
FD	55							0.046	0.043	0.043

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
FD	56							0.044	0.043	0.042
FD	57							0.043	0.043	0.041
FD	58							0.043	0.043	0.041
FD	59							0.047	0.043	0.045
FD	60							0.044	0.044	0.042
FD	61							0.048	0.047	0.046
FD	62							0.044	0.043	0.042
FD	<65	-	-	-				0.143	0.074	0.123
FD	<65	PT	-	-				0.014	0.020	0.014
FD	<65	FT	-	-				0.011	0.009	0.011
FD	<65	-	+	-				0.185	0.126	0.151
FD	<65	PT	+	-				0.094	0.086	0.085
FD	<65	FT	+	-				0.059	0.030	0.055
FD	<65	-			-			0.172	0.189	0.143
FD	<65	PT			-			0.029	0.049	0.028
FD	<65	FT			-			0.018	0.013	0.018
FD	<65	-			+			0.053	0.065	0.050
FD	<65	PT			+			0.010	0.005	0.010
FD	<65	FT			+			0.004	0.002	0.004
FD	<65					<20		0.162	0.179	0.136
FD	<65					>20		0.033	0.016	0.032
FD	<65						-	0.081	0.103	0.074
FD	<65						+	0.041	0.021	0.040

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
M.	51–52							0.007	0.007	0.007
M.	53–54							0.008	0.007	0.008
M.	55							0.009	0.008	0.008
M.	56							0.009	0.009	0.009
M.	57							0.010	0.011	0.010
M.	58							0.012	0.011	0.012
M.	59							0.013	0.010	0.013
M.	60							0.015	0.012	0.015
M.	61							0.013	0.012	0.013
M.	62							0.014	0.014	0.014
M.	63							0.015	0.015	0.015
M.	64							0.016	0.017	0.016
M.	65							0.020	0.019	0.020
M.	66							0.022	0.022	0.021
M.	67–68							0.023	0.025	0.022
M.	69–70							0.026	0.029	0.025
M.	71							0.036	0.038	0.035
M.	72							0.046	0.040	0.043
M.	73							0.045	0.040	0.043
M.	74							0.046	0.049	0.044
M.	75							0.057	0.052	0.054

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
M.	76							0.058	0.054	0.054
M.	77							0.063	0.053	0.059
M.	78							0.067	0.070	0.062
M.	79							0.074	0.068	0.068
M.	80							0.083	0.096	0.076
M.	81							0.088	0.086	0.080
M.	82							0.101	0.097	0.091
M.	83							0.110	0.107	0.098
M.	84							0.118	0.115	0.104
M.	85							0.133	0.117	0.115
M.	86							0.147	0.148	0.126
M.	87							0.170	0.173	0.141
M.	88							0.175	0.180	0.145
M.	89							0.213	0.207	0.168
M.	90							0.192	0.182	0.155
M.	$\leq$70		-	-				0.007	0.007	0.007
M.	$\leq$70		-	+				0.043	0.033	0.041
M.	$\leq$70	-			-			0.026	0.025	0.025
M.	$\leq$70	-			+			0.018	0.023	0.017
M.	$\leq$70	FT			-			0.006	0.006	0.006
M.	$\leq$70	PT			-			0.007	0.008	0.007
M.	$\leq$70	-	-	-				0.012	0.008	0.012
M.	$\leq$70	-	+	-				0.035	0.049	0.034

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
M.	≤70	FT	+	-				0.015	0.008	0.015
M.	≤70	PT	+	-				0.011	0.014	0.011
M.	≤70					<20		0.019	0.021	0.018
M.	≤70					>20		0.008	0.008	0.008
M.	<65						-	0.012	0.015	0.012
M.	<65						+	0.008	0.009	0.007
HI	51–55							0.140	0.123	1.011
HI	56–61							0.080	0.142	1.049
HI	62–66							0.066	0.131	0.965
HI	67–70							0.036	-0.114	0.892
HI	≤70	-	-	-				0.316	0.274	0.586
HI	≤70	FT	-	-				0.453	0.525	0.467
HI	≤70	PT	-	-				0.412	0.418	0.486
HI	≤70	-	+	-				-0.639	-0.490	1.081
HI	≤70	FT	+	-				-0.403	-0.264	0.936
HI	≤70	PT	+	-				-0.464	-0.524	0.949
HI	≤70		-	+				-1.321	-1.086	1.292
HI	≤70	FT			+			0.612	0.656	0.347
HI	≤70	PT			+			0.530	0.340	0.422
HI	≤70					<20		-0.121	-0.174	1.204
HI	≤70					>20		0.371	0.397	0.583

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
HI	<65						-	0.013	-0.206	0.971
HI	<65						+	0.341	0.335	0.690
E.	≤70	PT	-	-				55.27	52.50	2875
E.	≤70	FT	-	-				22.44	21.94	1416
E.	≤70	PT	+	-				39.99	43.671	1467
E.	≤70	FT	+	-				13.74	12.57	692
E.	≤70	PT			+			81.60	85.60	4917
E.	≤70	FT			+			32.71	26.01	2840
E.	51–55	FT			+			50.32	46.03	2702
E.	56–61	FT			+			47.07	43.37	2596
E.	62–66	FT			+			38.08	40.93	2432
E.	67–70	FT			+			26.43	30.01	1950
PHI	≤70	FT	-	-				0.866	0.885	0.116
PHI	≤70	PT	-	-				0.708	0.749	0.207
PHI	≤70	FT	+	-				0.787	0.786	0.168
PHI	≤70	PT	+	-				0.587	0.599	0.243
PHI	≤70	FT			-			0.835	0.861	0.138
PHI	≤70	PT			-			0.646	0.653	0.229
PHI	≤70	FT			+			0.924	0.923	0.070
PHI	≤70	PT			+			0.818	0.001	0.149
PHI	51–55							0.728	0.724	0.198
PHI	56–60							0.728	0.717	0.198
PHI	61–64							0.722	0.625	0.201

Table E2: List of Moments (Continued)

Out.	Conditions							Mean		Var.
	Age	LS	PD	FD	Ed.	C	HI	Data	Sim.	
PHI	≤70		-	-				0.768	0.713	0.178
PHI	≤70		+	-				0.582	0.624	0.243
PHI	≤70		-	+				0.274	0.315	0.199
PHI	≤70				-			0.644	0.606	0.229
PHI	≤70				+			0.851	0.836	0.127
MA	51–55							0.074	0.059	0.070
MA	56–60							0.076	0.069	0.070
MA	61–64							0.075	0.081	0.069
MA	≤70				-			0.093	0.092	0.084
MA	≤70				+			0.017	0.020	0.016

Notes: Table E2 shows the list of moments. All moments are conditional means calculated for the HRS data (1994–2016) and simulated data. The table's columns are as follows: 1.) The Out. column describes the outcome variables for which the means are computed. FT stands for working full-time, PT — working part-time, App. — applying for SSDI benefits, SSOA — receiving Social Security Old-Age benefits, SSDI — receiving SSDI benefits, PD — probability of being partially disabled, FD — probability of being fully disabled, M. — the mortality rate (the probability of dying in the next period), HI — health index, E. — earnings, PHI — the probability of being covered by private health insurance, and MA — the probability of being covered by Medicaid. In the model, individuals make labor supply decisions when they are between 51 and 70, they can apply for SSDI benefits when they are younger than 65, and they can apply for SSOA benefits when they are between 62 and 70. The massive retirement process that starts when individuals turn 62 years old affects their answers to questions about disability. As a result, I focus on the shares of disabled people below 62. 2.) Conditions columns list the variables on which the means are conditional. All non-age conditions are calculated based on lagged variables. "-" in the Conditions columns LS, PD, FD, Ed., and

HI stand for conditional on not working, not being partially disabled, not being fully disabled, not having a college education, and not having health insurance. "+" in the columns PD, FD, Ed., and HI stand for conditional on being partially disabled, being fully disabled, being college educated, and being covered by health insurance before 65. "C" is the consumption in thousands of 2018 US dollars. Consumption is the sum of earnings, SSDI, and Social Security Old Age benefits. 3.) Mean columns show the means for the HRS data (Data column) and the simulated data (Sim. column). 4.) The Var. column shows the variance of the means computed using HRS data. The inverse variance is used for the weights.