Claiming Social Security Benefits Early to Retire Later

Yarine Fawaz
European University Institute
e-mail:yarine.fawaz@eui.eu

Abstract

This paper examines Social Security benefit claiming behavior in the US using the Health and Retirement Study (HRS) to implement a duration model. It focuses essentially on the rushing/delaying behavior of the unemployed and investigates whether older unemployed individuals lacking liquidity use Social Security benefits as a safety net in order to finance consumption during an unemployment episode. This way, Social Security might be thought as a form of unemployment insurance which would allow them to maintain their standard of living during their job search. The purpose of this paper is hence to find empirical evidence about the potential insurance function of Social Security benefits, which would provide support for integrating Unemployment Insurance with Retirement Insurance even before eligibility to Social Security (SS) benefits.

Keywords: Retirement Decision, Social Security, Job search, Survival analysis.
JEL classification: H55, J26, J64, C41.

1 Introduction

The first baby boomers turned 62 in 2008, the magical age at which one can begin to claim Social Security retirement benefits that will be received from that moment until death. Nearly 80 million Americans of the baby boom generation will become eligible for Social Security benefits over the next two decades, a phenomenon known as America's "silver tsunami". The ratio of workers to retirees (*i.e.* all persons aged 50 and over who are not in the labor force) is projected to fall from over three to one to around two to one in 2030. As a result, growing expenditures on social security will have to be financed by taxes on a smaller number of workers as compared to pensioners or by cuts in the amount of social security benefits. Hence, the retirement decision, and more precisely the age of retirement, has become a key variable.

In the US more than any other OECD country, Social Security take-up and retirement are two distinct concepts, for older Americans may consider themselves as "retired" if they have already exited labor force and are not entitled to Social Security Old Age Benefits, and on the other hand may receive Social Security benefits while still working. Although there is a large body of literature building upon the determinants of retirement, most studies usually focus on the decision to stop working assuming that older individuals claim on retiring, or as soon as they become eligible if they had stopped working before age 62. I believe that the take-up decision deserves as much focus as that of retirement, as Social Security benefits imply making a decision, as it is the case for other social insurance programs. In other words this decision is worth being investigated as people do not claim as soon as they are eligible, as a fatality, but may weigh the pros and cons of claiming early (*i.e.* before the normal age of Social Security take-up). By doing so they forgo large benefits accruals that could be paid to them and their spouses until their deaths, but on the other hand enjoy retirement benefits for more years and without waiting any longer. For example, a "boomer" with a final annual salary of $75,000 might receive a $1,388 monthly Social Security check if he collects at age 62; if the same boomer were to delay until age 66, he would get $1,917 monthly. Yet, most retirees apply for Social Security benefits early: according to the Social Security Administration data for year 2010, 74% of current recipients receive reduced benefits because they started their benefits prior to their Full Retirement Age.

Early claiming has therefore become a social norm although it had been designed as an exception. This phenomenon is part of the larger puzzle of early retirement, which reduces the period over which households accumulate wealth and increases the period over which they decumulate, hence it is crucial for policy implications to understand the pattern of Social Security benefits take-up of older individuals. More precisely, the claiming decision of those who stay in the labor force should be deeply investigated, as claiming and retirement are separate decisions in that case. Besides, those individuals have not retired yet, so that they should be the target of public policies aiming at maintaining older individuals in the workforce.

Descriptive evidence from the Health and Retirement Study (HRS) support the existence of a group of individuals within the labor force who claim benefits as soon as possible, before they withdraw from the labor market. Such a group is made of workers and unemployed individuals. There are various reasons why workers may claim Social Security (SS) benefits while continuing to work, resorting to the insurance function of Social Security (SS) benefits. Indeed, workers may want to initiate the payment of their SS benefits in case they need a new source of income very urgently, for instance if they fear that they could lose their job. Besides, there is a widespread concern among US citizens that a new legislation in terms of SS entitlements might make them worse off, so that claiming as soon as possible would allow them to secure their monthly retirement benefits. For the unemployed, claiming while not retiring means claiming and continuing to look for a job. As these individuals have no earnings from work, claiming as soon as becoming eligible to SS benefits might be their best option, particularly if they run short of liquidity. On the other hand, the fact that they do not retire when they claim implies that they have not given up on work, and will keep on searching. My hypothesis is that older unemployed individuals lacking liquidity use Social Security benefits as a safety net in order to finance consumption during an unemployment episode. This way, Social Security might be thought as a form of unemployment insurance which would allow them to maintain their standard of living during their job search. The purpose of this paper is hence to find empirical evidence about the potential insurance function of Social Security benefits, which would provide support for integrating Unemployment Insurance with Retirement Insurance. As put forward in [Stiglitz and Yun, 2005], an integrated insurance system would provide workers with individual accounts that would allow them to borrow against their future wage income to finance consumption during an unemployment episode, thus improving their search incentives while reducing risks.

I present estimates of the probability of claiming at any age in a duration model framework, along with the estimates of the impact of being unemployed and lacking liquidity on early claiming in a probability model. I find empirical evidence of higher odds of claiming early SS benefits for unemployed individuals and more generally those at the very bottom of the distribution of total household income. If both conditions are satisfied, the probability of claiming early and remaining on the labor market explodes: according to my estimates, such a group is about 26 per cent more likely to claim benefits while staying in the labor force than full-time workers from the first quartile of household income.

The remainder of the paper is structured as follows. Section 2 reviews the existing Social Security literature, Section 3 describes relevant institutional features of the American

Social Security system that will be necessary to understand the Social Security claiming pattern and motivates the purpose of the current study. Section 4 describes the data and the econometric models I estimate. Section 5 displays the empirical results of probability and duration models. Section 6 offers some conclusive remarks.

2 Literature Review

The retirement literature is outstandingly rich. Most studies have focused on studying the effects of Social Security on labor supply and wealth accumulation. Some of them use aggregate data to reveal the impact of Social Security by examining the labor force behavior of older workers at different ages. Hurd [1990] and Ruhm [1995] find a spike in the age pattern of retirement at age 62 and show that this peak has grown over time as Social Security benefits have increased; besides, Burtless and Moffitt [1984] show evidence that this peak did not exist before claiming at 62 became possible. Another peak at age 65 may be the result of an unfair actuarial scheme that discourages working beyond age 65. Blau [1994] shows empirically the existence of this peak since nearly 25% of the men in the labor force on their 65^{th} birthday retire in the next quarter in his data, which is 2.5 times more than the hazard rate of the surrounding quarters. In the same vein, other related literature has approached the issue by estimating structural models of retirement (Rust and Phelan [1997]; Gustman and Steinmeier [2002]; French [2005] to name some of the most recent research efforts). All these studies examine labor force behavior of older workers, more precisely the timing of the withdrawal from labor force for older workers. The latter paper tries to replicate the spikes in retirement activity at ages 62 and 65 by introducing heterogeneity in taste for leisure and discount rate, as the first spike has no other rational explanation, contrary to the traditional bunch at age 65 (declining benefit accrual profile). Thus these models aim at understanding early retirement behavior as a function of Social Security rules.

Another strand of the literature uses micro-data sets with information on potential Social Security benefit determinants or ex-post benefit levels to measure the incentives to claim across individuals in the data. To do so, several sophisticated measures of Social Security incentives have been computed: first Social Security Wealth (SSW) as present discounted value of future Social Security entitlements, then retirement models have included functions of SSW accruals in the case of additional years of work. Stock and Wise [1990] introduce another forward-looking measure, namely the option value, which contrasts the utility of retiring today versus at some optimal date in the future. Coile and Gruber [2004] improve the latter measure with the "peak value", defined as the difference between SSW at its maximum expected value and SSW at today's value. As such the peak value incorporates the insights of the option value measure and appropriately considers the trade-off between retiring today and working to a period with much higher SSW, but focuses solely on variation in Social Security incentives, rather than variation in earnings. Although most of this literature concludes that Social Security has large effects upon retirement, these effects appear very small compared to the time trend in male retirement over the past 50 years.

Besides, as pointed out in Coile, Diamond, Gruber, and Jousten [2002], this literature suffers from a potential weakness consisting in the endogeneity of the timing of Social Security benefits claiming and therefore of the benefits level. Indeed, using actual Social Security benefits as the key independent variable to explain Social Security take-up decision instead of using Primary Insurance Amounts (PIAs) must produce biased estimations of the impact of Social Security upon retirement since Social Security benefits are themselves a function of the timing of Social Security claiming. As I do not have access to restricted data, PIAs are not available in the dataset I use for this analysis, but I do not use Social Security benefits level either because of the endogeneity issue raised before.

Existing literature is also deficient in assuming most of the times that retirement and claiming are one unique decision. This way, there may again be some mismeasurement of the key regressor (the accrual rate for instance) since claiming can be delayed after retirement. In other words, if claiming is distinct from retirement as cessation of work, then it limits the impact of additional work on SSW accruals; the major impact stems from delayed claiming, and studies focusing on that of additional work may miss an essential piece of the retirement timing puzzle.

Yet, a few papers did analyze independently the Social Security claiming and the retirement decisions. First, Coile, Diamond, Gruber, and Jousten [2002] examine the claiming behavior of single and married men who had retired before age 62, thus unable to claim benefits upon retirement. They consider the age of claiming as a purely financial decision, separate from their decision to retire. Using data from the Social Security Administration's New Beneficiary Data System (NBDS), they find that most men in their sample claim as soon as they become eligible, or soon thereafter. Yet a substantial minority, whose characteristics imply greater Expected Present Value of Benefits (EPVB) if they delayed, does so. Household wealth is identified to influence the age of claiming, as both tails of the wealth distribution are more likely to claim early, suggesting impatience and/or liquidity constraints at low wealth levels, and strong bequest motives at high wealth levels. Finally, even when controlling for this inverse U-shape, households appear to leave significant amounts of SSW "on the table".

Second, Hurd, Smith, and Zissimopoulos [2003] analyze the Social Security take-up decision as an independent decision, using the first four waves of the Health and Retirement Study (HRS). The only variable they identify to explain claiming ages is subjective mortality beliefs, with little explanatory power. Again, they find that most households do not maximize their SSW, claiming too early. Sass, Sun, and Webb [2007] follow the same approach in order to investigate the reason why married men claim Social Security benefits so early. Limiting their sample to households who retired prior to becoming eligible to claim Social Security benefits, they find no statistically significant relationship between the age of claiming and either household wealth, or expected longevity.

The study of the claiming of retirement benefits for non-retired individuals who stay in the labor force after claiming has received considerably less attention. Most of the literature investigating the claiming decision in that context has focused on the taxation aspects of the earnings test (Burtless and Moffitt [1985]; Honig and Reimers [1989]; Baker and Benjamin [1999]; Friedberg [1998, 2000]; Votruba [2003]). In other words they address the issue of the incentives or disincentives to continue working after claiming that are provided by the earnings test. Last, Benitez-Silva and Heiland [2005] make a fruitful attempt to fill the gap due to the relatively little research on labor supply and claiming behavior of early retirees, by jointly modeling labor supply and claiming decisions in a duration analysis framework. Their study is even more innovative in that they examine the small part of early claimers who do not withdraw from labor force at the time of claiming, and shows that the latter exit labor force later than their counterparts who claim benefits later, because they have a greater incentive than later claimers to continue to work and earn above the earnings limit to increase the benefit rate effective when they retire after reaching their NRA[1]. Though inspiring for the issue I am dealing with, this paper focuses on workers and the impact of the complex rules of the earnings test on labor force withdrawal whereas I am committed to examining the claiming pattern of the unemployed, and finding evidence of the role of SS benefits in financing the job search process of these unemployed individuals. In addition, the latter study looks at claiming and retirement patterns between age 62 and age 65 because the earnings test only apply between those ages. I investigate early claiming too because age 62 is the first opportunity for unemployed individuals to claim and use SS as a form of unemployment insurance, but the question that I raise still apply on longer delays. The unemployed may use SS benefits to finance their consumption while searching at any age, but few will delay past the Normal Retirement Age.

The relationship between unemployment and Social Security claiming has been at the core of many papers abroad, and even some in the US. Hutchens and Jacobson [2002] look at the distribution of ages at which people receive unemployment insurance (UI),

[1] As it will be stated in the next section, there is a permanent reduction of the monthly benefit amount when benefits are claimed before the NRA. Actually this reduction may not be permanent as there is a possibility to reduce the penalty after initiating the receipt of benefits, if the claimer continues to work or re-enter the labor market, and earns more than the ceiling of the earnings test (so that his receipt of benefits is suspended) until the NRA.

before and after the law forbidding receiving both UI and SS at the same time. Spikes at the ages of 62 and 65, which are the "conventional" retirement ages, tend to underline a relation between SS and UI. In other countries the issue of a possible link between unemployment at older ages and transitions to retirement have been dealt with more deeply. Hallberg [2006] finds that the probability that a worker takes early retirement in Sweden depends on deviations in aggregate employment in his industry from the long-run trend. Other researchers found out that many older workers spent some time living on UI immediately before they claimed SS benefits. In Sweden they were only 7 per cent of older workers according to Palme and Svensson [2004], but they were 15 per cent in Belgium (see Dellis, Desmet, Jousten, and Perelman [2004]), over 20 per cent in France and Germany (see Mahieu and Blanchet [2004]; Borsch-Supan, Schnabel, Kohnz, and Mastrobuoni [2004]), and almost 40 per cent in Japan (see Oshio and Oishi [2004]), where applying to UI is considered to be normal for anyone losing his job, whether he looks for another job or not. Thus in all these countries, and many others, unemployment insurance is often used as a kind of early retirement benefits, while awaiting legal social security benefits.

According to Coile and Levine [2006],

> while SS is traditionally thought of as a source of support for retired and disabled workers, they may serve as an additional source of support for older workers who lose their jobs. If an older unemployed worker is struggling financially, he may be forced to start collecting either of these forms of benefits to make ends meet. Although one does not necessarily need to retire to collect these benefits, benefit receipt is typically linked to retirement. In terms of providing income support to older unemployed workers, SS may be thought of as an alternative form of unemployment insurance.

In line with this study, I intend to pinpoint the social insurance role of SS benefits, more particularly for the unemployed, but also for those workers whose resources are insufficient to pull through. In the following I will underline the role of lack of income in the claiming decision, and show that a substantial part of workers and unemployed individuals at the bottom of income distribution choose to claim early SS benefits without withdrawing from the labor market, which suggests that they do so because they "need the cash" independently of their will of retiring.

3 Institutional Features and Motivation

3.1 Institutional Features of the Social Security System

A brief overview of the US Social Security system is required to understand the motivation to this analysis. First, Social Security retirement benefits earned by reason of one's own contributions can be claimed at any age from 62 to 70, subject to an earnings test that has become less stringent over time. The calculation of benefits involves four steps. First, a worker's previous earnings are restated in terms of today's wages by indexing past earnings to wage growth. Second, earnings for the highest 35 years are averaged and divided by 12 to calculate the Average Indexed Monthly Earnings (AIME). Third, the Social Security benefit formula is applied to AIME to produce the Primary Insurance Amount (PIA), the benefit payable at the Full Retirement Age (FRA). Finally, benefits are adjusted to produce permanently lower or higher benefits for those who claim before or after the FRA, so that the system is roughly actuarially neutral (see Section 7.1 in the appendix for further detail).

The FRA is not a static concept: it has been 65 for many years; however, beginning with people born in 1938 or later, that age gradually increases until age 67 for people born after 1959. One of the specificities of the US Social Security system is that retirement need not be concurrent with claiming. Ceasing work is not required, though Social Security takers are subjected to an earnings test: if their earnings exceed a certain amount, benefits are reduced by $1 for each $3 earned before FRA[2]. Above the FRA, the earnings test has been eliminated since 2000.

3.2 Motivation and Hypothesis

Figure 1 shows evidence of how complex the SS claiming decision may be. Indeed, because the SS system is roughly neutral for an average individual (living the average life expectancy), there is much room for decision making. Older individuals nearing the eligibility to retirement benefits are so confused about what they should or shouldn't do that some private insurance companies have made a business out of it. Figure 1 is an example of on-line counceling provided by Metlife (Metropolitan Life Insurance Company). "When should I retire? Should I take Social Security benefits right away? How do I make the most of what I have? In just three quick steps, the Social Security decision tool will help explain why delaying your benefits could potentially increase the amount of money you collect over your lifetime". Taking the three quick steps ("how old are you?", "are you a male or a female?", "how much did you earn last year, or the last full year you worked?") results in that figure. What kind of information does the SS decision tool provide? As-

[2]This amount has been increased over years, from $9,120 of annual earnings in 1998, to $37,680 today.

suming that I am a 61 year-old male whose last annual earnings amounted to $75,000, my monthly benefits will be $1,388 if I claim at age 62, compared to $1,917 if I postpone until the full retirement age of 66. As I have 70% chances of living past age 76, which is my break-even age[3], I should probably delay the claiming of my benefits. Indeed, if I do so, by age 85 (that I will reach with a 50% probability) I will have accumulated $53,988 more; by age 92 (which I will outlive with a 25% probability) this figure goes up to $98,424. Therefore, any individual is advised to delay the claiming of his benefits unless he expects to die before his break-even age. In other words, "If you don't need the income to support your lifestyle from age 62 to 66, it's often best to wait".

Conversely, if you are unemployed at age 61, and you do not have enough available wealth to maintain your standard of living while you are looking for a job, claiming Social Security can barely be considered as a choice-based decision (see Section 7.2 in the Appendix to get a better understanding of the SS actuarial adjustment and why lack of liquidity may induce older individuals to claim early). Furthermore, using the insights provided by the analytical framework presented in the Appendix, liquidity-constrained individuals are likely to have a much stronger preference for the present, and thus higher discount rates (all the more since their life expectancy is lower), so that they will pay more attention to the present flow of SS benefits than to the loss of future higher benefits. As a result these individuals -unemployed and/or lacking liquidity- will have incentives to claim early benefits. Besides, borrowing against future SS benefits is not allowed, so that they may need to resort to early SS benefits in order to finance their consumption, even if they are not willing to retire.

The same goes for part-time workers, since their salary may be low enough to make claiming more valuable to them than delaying. Besides contrary to full-time workers, they are very likely to earn less than the ceiling of the earnings test and therefore increase their total income by claiming and continuing to work at the same time without paying additional taxes. Coile, Diamond, Gruber, and Jousten [2002] show that, among those who are eligible for full benefits under the existing earnings test, claiming is very high. In particular, among those who have earnings at their 62^{nd} birthday below the earnings test level, roughly 90% claim within a year of turning 62. Among those whose earnings drop below this level after their 62^{nd} birthday, claiming is even higher, with essentially no one who retires from age 65 onwards delaying claiming. So I do not expect wealth and income to impact the claiming decision of the unemployed more than that of the part-time workers, but the intuition behind both patterns is different.

Although it is optimal for a wide class of preference parameters to delay claiming beyond the date of initial benefits entitlement (see Coile, Diamond, Gruber, and Jousten

[3] the "break-even age" is the point at which the cumulative value of early retirement benefits is trumped by the money that would have been paid to the claimant had he waited until his full retirement age.

[2002]), there are several reasons why older individuals could prefer early claiming. First, they may not understand the functioning of the actuarial adjustment, more precisely how benefits are increased to compensate for forgone benefits when the claiming is delayed. Secondly, individuals may be myopic in that they claim early due to high short-run discount rates, but regret this decision later due to lower long-run discount rate, hence behaving in a “time-inconsistent” manner. Diamond and Koszegi [2003] speak of “quasi-hyperbolic discounting”.

As I mentioned before, the rationale for claiming early while not withdrawing from the labor force may be more specific. Some workers might file for SS benefits just in case they lose their job in order to secure a new source of income (which can be received at the same time as unemployment insurance). Indeed, processing the inital SS claim takes up to 3 months, which reduce to 6 weeks if the initial claim occurred before. Hence, workers whose job is insecure, or whose level of risk-aversion is particularly high, may claim SS benefits and continue working. Another popular belief about SS is that “a bird in the hand is better than two in the bush”. In other words, you’d better hurry up to claim SS benefits as long as the SS system is guaranteed by the government.

My hypothesis is that there may be another explanation -which is proper to the unemployed- for claiming early while staying in the labor force. Social Security might be thought of as an alternative form of unemployment insurance. The existence of a relationship between unemployment and retirement had already been put forward in previous studies (Hutchens and Jacobson [2002] and Coile and Levine [2006]). But these findings only dealt with claiming when coupled with retirement. Put differently, unemployment induces older workers to retire in order to collect SS benefits. The question that I hereby raise is different in that I study the impact of unemployment on claiming while staying in the labor force, *i.e.* continuing to look for a job. I expect to find some evidence of the impact of unemployment combined with lack of total income on early claiming, in order to prove that there is a group of unemployed individuals who do not want to retire, and use SS benefits as a financial means to carry through their job search. In other words, those early claimers borrow from their pensions in order to ease the burden of reduction in their lifetime income and spread it more effectively over a longer working life as these benefits allow them to keep looking for a job and stay longer on the labor market. One way to validate this interpretation would be to study the time to exit labor force of these unemployed early claimers compared to the other unemployed who did not claim early, and check that early claimers exit the labor force more slowly than their counterparts. One problem is that older unemployed individuals are quite scarce once the age of SS eligibility has been reached, which makes it hard to compare the exit patterns of these two groups.

4 Data

4.1 Data Description

The database I use is the Health and Retirement Study (HRS), which is the first database in terms of health, retirement, and aging in the US. Initially the HRS was a longitudinal study upon individuals aged 51 to 61 at baseline (that is, in 1992), and their spouses, who could be younger or older, with new interviews of these 12,652 respondents from 7,702 households, every two years. Since 1998 the HRS has enriched of two older cohorts (born before 1924 and between 1924 and 1930), and two younger cohorts (born between 1942 and 1947, and between 1948 and 1953). This study exploits data from both the original HRS and version I of the data prepared by RAND. The RAND HRS data is a cleaned and processed version containing many variables from HRS, for about five cohorts, during eight waves separated by one or two years, from 1992 until 2006. The HRS is the best available database to explore retirement issues in the US as a mine of information concerning health, wealth, demographics, respondents' expectations and projects concerning retirement, *etc.* Yet, its biennal structure makes it possible to observe transitions from one state (*e.g.* work or unemployment) to another (*e.g.* retirement), but hard to study their determinants as most variables are only measured at the time of the interview, *i.e.* every other year. Most importantly, it offers enough information (particularly the exact date of SS take-up) to allow a survival analysis of claiming delays, which might be the best tool to analyze Social Security claiming behavior.

In all the following empirical analyses, the sample is composed of individuals (male and female) who are part of the labor force, as workers or unemployed; partly-retired[4] individuals are discarded as their status is hybrid between workers and job searchers. I exclude those who ever applied to disability benefits because disability is a separate pathway to retirement that is subject to its own particular rules (this is quite common an assumption in the previously cited literature). Last, I only consider those who are or will become eligible to SS benefits at next wave, *i.e.* individuals having a 10-year job history at least, and who are or will be "62 enough" [5] to claim their benefits by next wave. Those who claimed before age 62, sometimes as early as age 10 (survivors), or from age 60 for dependent spouse benefits, are not part of this study.

I estimate two econometric models to address one question. The first one is a duration model that investigates time-to-claiming. Therefore, individuals live/survive from the

[4] An individual is classified as partly retired if he is working but still mentions a retirement status or if he mentions being retired while looking for a job.

[5] Workers are not instantly eligible for Social Security retirement benefits on their 62^{nd} birthdays, nor can they receive benefits in the month they turn 62. I follow the methodology described in Olson [2000] in order to correctly approximate the pool of HRS respondents who are old enough to have reported the receipt of their first retirement benefit.

moment they become eligible to Social Security early benefits, *i.e.* age 62, until they claim Social Security benefits. Observed spells start the month prior to the 62^{nd} birthday, so that a duration of 13 months for instance would mean claiming at age 63. As birth and Social Security take-up dates are available in the HRS, the exact duration is known, even though Social Security take-up may occur between two waves. The resulting sample is made of 7,221 observations, representing 4,603 subjects aged between 60 and 70, amongst whom 3,445 "failed" over the observation period, the others being right-censored (they do not undergo the event during their observation period).

The second econometric model is a cross-sectional analysis of the joint probability of claiming SS benefits and retiring between the waves before and after the 62^{nd} birthday. Contrary to the duration analysis that focuses on one event, this cross-sectional analysis considers simultaneously the possibility of claiming and retiring. By doing so I will be able to derive predictions of the probability of claiming *and* not retiring. The sample is restricted following the same rules as in the survival analysis, except that individuals are only observed before and after their 62^{nd} birthday. It thus consists of 3,879 observations, representing this time 3,879 individuals. Both models estimate the determinants of the claiming decision, but the cross-sectional probability model emphasizes early claiming (at age 62) while the duration model is the most natural framework to analyze claiming delays from the month respondents become eligible until their "failure" or exit from the sample.

4.2 Descriptive Statistics

As shown in Table 2 I use a comprehensive set of control variables that includes gender, marital status, education, the number of people in the household, health (whether health status limits the ability to work, whether the individual rates his health status as excellent), self-expectations of mortality (whether the individual believes he has more than 50% chances of living until age 75), whether the respondent receives some private pension income, job history (the number of worked years), and total household wealth, which is displayed as a continuous variable in Table 2 but will be included as quartiles in the regressions. The key variables of the analyses are the labor force status, divided into full-time workers, part-time workers, and the unemployed, along with total household income. Net total household wealth is defined as the sum of housing wealth (primary and secondary residences less mortgages) and financial wealth (financial assets as well as liquid savings) less all debts. The only component that is not included in that global measure of wealth is Individual Retirement Accounts (IRA). Total household income includes earnings from work, household capital income, income from employer pension or annuity, unemployment insurance or worker's compensation, other government transfers (veteran's benefits, food stamps, *etc.*), and other household income such as alimony or lump sums from insurance, pension or inheritance. As some of these covariates are time-varying and data are discrete, they are assigned their value from the closest previous survey wave.

Although the sample size of the duration analysis is bigger than that of the cross-sectional one, because there are several observations per individual, the means and standard deviations of the covariates are very similar. The sample is roughly divided into 84% of full-time workers, 14% of part-time workers, and 2% of unemployed individuals. There are few unemployed at older ages because most of them stopped looking for work and therefore became self-reported retirees, which makes it difficult to analyze the claiming behavior of the unemployed in a subsample. Hence I consider the whole labor force sample, and use labor force status as a key explanatory variable rather than to construct distinct subsamples.

Tables 3 and 4 show descriptive evidence of a specific claiming pattern of the unemployed. The frequency distributions of the time-to-claiming spells are displayed in Table 3. These are not survival times, since some of the subjects are censored (25%). As expected, the unemployed have shorter spells (18 months on average) than part-time workers (32 months), and full-time workers (27 months). Half of the unemployed claim within 8 months after turning 62, while the median spells are 17 months for part-time workers and 25 months for full-time workers. Put differently, more than 60 per cent of the unemployed claim as soon as possible (*i.e.* between the waves before and after turning 62, see Table 4), compared to 57 per cent of part-time workers and 36 per cent of full-time workers.

A clear pattern also emerges from these statistics for household income quartiles. Indeed, bottom quartiles are associated with shorter spells (very clear for median durations), and higher probabilities of claiming early. As for household wealth, it seems too that the left tail of the distribution exits sooner, but the picture is more fuzzy.

4.3 Non-Parametric Analysis

Though unconditional, non-parametric analysis allows us to learn from the data without making any assumption about the distribution of time to failure, nor about the form that will take the effects of the covariates. The philosophy of non-parametric approaches is to "let the data speak for itself". Duration analysis provides a set of "user-friendly" non-parametric tools such as Kaplan and Meier and Nelson and Aalen's methods to estimate the probability of survival past a certain time, or to compare survival experiences for several groups discriminated by some covariates, which is a first step before deeper econometric analysis. These methods account for censoring and other characteristics of survival data, which was not the case in the previous section.

Figure 2 plots the survivor function estimated by the Kaplan-Meier method. The Kaplan-Meier estimate of the survivor function is given by the product of 1 minus the number of exits divided by the number of persons at risk of exit, *i.e.* the product of 1 minus the exit rate at each of the survival times. Last observed exit occurs at month 161. The shape of these step functions is not like a regular staircase: the height between steps varies (depending on the survivor function estimates), so too does the width of the steps (depending on the times at which failures were observed). The survivor function shows a highly irregular pattern of claiming: first the "slopes" of the step function, or the height of the steps, are higher at round ages, as people are always more prone to make transitions at round ages. Second, these higher slopes, which correspond to spikes in Social Security benefits take-up, are not all of same magnitude: the two highest steps correspond to the early and normal retirement ages (62 and 65, more precisely the 3 first months following 62, and the 2 months following 65); other spikes are observable at ages 63 and 64, but of lesser magnitude; there seems to be another spike of high magnitude around 48 months, due to the shift of the NRA (normal retirement age) from age 65 to age 66. Trying to estimate the slope of the integrated hazard function at each of the observed survival time is quite tricky as it is equivalent to trying to find the slope at the corner of each of the steps. Clearly the slope cannot be well-defined, nor is any non-parametric estimate of the hazard rate. Figure 3 shows the hazard contribution obtained by deriving estimates of the interval hazard rate. The second spike (at age 65) seems greater than the first one because these are hazard rate estimates, not claiming propensions. The hazard rate of claiming can be defined as a conditional probability. For example the hazard rate of claiming at age 63 is the probability of claiming at age 63 conditional on not having claimed until that age. Hence even though more people claim at age 62 than at age 65, the hazard rate is much higher at 65 because the number of individuals failing is divided by the number of individuals at risk at each survival time, and the latter number strictly decreases with time.

Figures 4 and 5 confirm what descriptive statistics suggest, while offering greater details. The unemployed "fail" sooner than workers, and the difference in their survivals comes mainly from the first three months after turning 62: at age 62 and three months almost 50 per cent of the unemployed have already claimed, compared to less than 30 per cent of part-time workers and much less for full-time workers. So it seems that unemployment induces older individuals to claim as soon as possible. Later than 62, there is another big "rush" into claiming at age 63 for the unemployed, so that the gap with those who are still working keeps on widening, and few unemployed individuals remain in the risk pool after age 63.

Kaplan-Meier estimates by wealth and income quartiles are good representations of the patterns described above: the more income individuals have, the later they claim; the picture is less clear for wealth, except for people in the top quartile, whose survival curve is much higher than the other three, meaning that only the very wealthy claim later.

4.4 A Few Caveats

Before going further with the econometric analysis, there are a few traditional issues that I would like to mention as being knowingly ignored in this study. When dealing with claiming and retirement and the effect of claiming on retirement and vice-versa, endogeneity concerns are quite common. Indeed, studying the influence of having claimed on the labor force exit decision might entail some difficulties as the claiming behavior is potentially endogenous to the retirement behavior, if individuals consider whether to claim or delay when choosing their retirement date. I cannot solve this concern in the duration analysis, but the bivariate analysis allows me to study the two outcomes simultaneously, and thus to identify the determinants of claiming while staying in the labor force. Therefore, the two models bring their own contribution to explaining the SS claiming decision. On the one hand the duration model offers a comprehensive understanding of the timing of SS claiming, and of the impact of covariates on claiming hazards. On the other hand the bivariate probit allows to calculate the joint probabilities of two nonindependent events, *i.e.* claiming and retiring, at the age of 62, and hence to check the impact of covariates on the probability of claiming early while staying in the labor force. Another point to mention is the number of covariates, which I restricted on purpose. Indeed, this study focuses on the unemployed, while most of the variables that are available in the HRS are specific to retirees or workers (earnings, number of hours, type of occupation, health impairments due to the job,*etc.*). Therefore I consider that all job characteristics are contained in the labor status variables, which is not an issue when the core of the study lies in the behavior of the jobless in opposition to workers.

Finally, there is a reason for which many studies consider the implications of the earnings test when studying the determinants of SS benefits receipt. Some brought evidence of the existence of a relationship between the earnings test and SS claiming behavior. Disney and Tanner [2000] in their study of the removal of the earnings test in the UK, show that lifting the earnings test can lead to more claiming of benefits by those already working. Gruber and Orszag [2000] find that loosening the earnings test leads to increased benefits recipiency. Their estimates indicate that a $1,000 rise in the earnings test threshold would increase the share of the elderly receiving Social Security benefits by 0.69 to 1.59 percent, and that complete removal would increase that share by 5.2 to 13.5 percent. These large effects are consistent with evidence from the removal of the earnings test in Canada shown in Baker and Benjamin [1999]. Thus, completely ignoring the incentives and disincentives to claim provided by the earnings test would be a mistake. As any person retiring before NRA is potentially subject to an earnings test when claiming social security benefits, both individuals' current income and expectation of prospective income are crucial variables in determining their claiming decision. For example, if you are unemployed and expect to remain unemployed, then you may as well claim social security benefits as early as possible in order to secure that source of income. Conversely if you are temporarily unemployed but expect to return to full-time work, then this strategy might not be so attractive. Unemployed and low-hours workers may well use social security as some sort of social insurance but these earnings-test related incentives could be important also, hence the need to differentiate between the two hypotheses. One way of overcoming this issue would consist in using individuals' subjective probability of continuing full-time work after age 62 (and 65). This measure has been well documented in, *e.g.*, Hurd [1999], Chan and Stevens [2004] and Michaud and van Soest [2007]. It refers to the question: "Thinking about work generally and not just your present job, what do you think are the chances that you will be working full time after you reach age 62?". A similar question is asked with respect to the chances of continuing work after age 65. Unfortunately, this question is only asked to employed individuals, so that it cannot be introduced as an additional explanatory variable along with labor status variables. It could be used as some kind of check of the insurance role of SS benefits for workers. Let aside the unemployed, if workers from the bottom income quartiles have higher odds of claiming early and retiring later, including when their expectations about if they will continue full-time work after the earliest age of eligibility are controlled for, then the assumption that they claim early because they need an alternative source of income is no longer challenged by that of the earnings test disincentives to claim early if one expects returning to full-time employment. Thus I will perform some sensitivity checks consisting in adding these expectations in the set of covariates (see section 5.5).

5 Econometric Methods and Results

5.1 Survival Analysis of the Claiming Decision

To empirically assess the influence of being unemployed and without enough resources to pull through, I estimate hazard models of SS claiming. I expect to find a specific claiming pattern for the unemployed and more generally for those lacking liquidity. My empirical strategy consists in specifying only a functional form for the influence of covariates while leaving the shape of the transition rates as unspecified as possible. In other words the model to be estimated is a semiparametric Cox model. The hazard rate for the j^{th} subject in the data is :

$$h(t|X_j) = h_0(t)exp(X_j\beta_x) \tag{1}$$

The transition rate, $h(t)$, is the product of an unspecified baseline rate, h_0, and a second term specifying the possible influences of a covariate vector X_j on the transition rate. This is a special case of so-called proportional transition rate models because the effects of covariates can only induce proportional shifts in the transition rate but cannot change its shape. First a global test of this assumption, based on Schoenfeld residuals, leads to reject the null hypothesis of a log-hazard ratio that is constant over time. Then I implement graphical methods on the variables that cause the rejection of the PH assumption (see Figure 6): by plotting the transformation $-ln(-ln(S(t)))$ for the two survivor curves corresponding to the employed and the unemployed ($S(t)$ being the survivor function) against $ln(t)$ on the x axis, I find no clear-cut evidence in favor of or against the proportional hazard assumption. Indeed the two curves, which should be parallel for the assumption to be verified, end up crossing, but only after a long period of survival, around 50 months. So there seems to be a "rank inversion" for some of the tested covariates, when the curve representing the highest survival crosses the other curve and then stays below. Actually, this result is not surprising as the slope of the highest survival curve might become greater than that of the lowest at the point where the risk pool of the less surviving group becomes too small. Here workers survive better than the unemployed (*i.e.* they claim later) but their survival curves are almost perfectly parallel, until that of the working group crosses that of the unemployed, because the at-risk pool of unemployed individuals has become too small since most of them already failed. This is a pure mechanical effect, which occurs after long enough delays not to bother the implementation of the Cox model. Another way of checking the PH assumption consists in comparing separately estimated Kaplan-Meier curves (which are model agnostic) with estimates of the survivor function from a Cox model, which does impose the PH assumption. However, this method does not allow other covariates to be introduced. Figure 7 shows that what Cox estimations miss with the PH assumption is the very strong effect of being unemployed within the first 12 months or so. Actually, assuming the hazards are proportional leads to smoothing the effect of the variable over the survival time. If the focus of the study is not the timing of the effect of the covariates but the very effect of the variable, then the PH assumption may be considered as verified. Hence in the following I investigate the impact of every covariate on durations considering that this effect is constant over time, but it is useful to keep in mind that the impact of labor force status, as well as that of income (since these variables are those which are suspected not to hold the PH assumption), is much stronger on short durations.

Last thing to know about the Cox model is that Cox estimates are based on forming, at each failure time, the risk pool or risk set, *i.e.* the collection of subjects who are at risk of failure, and then maximizing the conditional probability of failure. The times at which failures occur are not relevant, but the ordering of failures is (partial likelihood method). As such, when subjects are tied, *i.e.* fail at the same time, and the exact ordering of failures is unclear, the situation requires special treatment. This is particularly the case here, as many people have the same survival times (1, 13, 25 months, *etc.*). The way ties are handled depends on the reason why survival times are tied. If one believes that failures did not really occur at the same time, but the data says so because it is not continuous (for example dates are precise to the month but not to the day), then the marginal calculation method considers all possibilities (one subject failed and then the other, or conversely) and computes the sum of all these conditional probabilities. Breslow and Efron's methods are approximations of the exact-marginal calculation. If failures really occur at the same time then the partial calculation computes the right probability, but it can produce bad results when risk pools are large and there are many ties, so that I only test the other methods, and show Breslow's method estimations.

In alternative specifications, I include with the set of control variables the labor force status alone, income quartiles alone, both, and finally interactions between labor force status and income quartiles. If the unemployed have a particular pattern of claiming relatively to their total income, I expect these interactions (or only some of them) to impact significantly the claiming hazard.

Such interaction effects should be handled with particular care. Indeed there has been much discussion on how to interpret these in non-linear models (Ai and Norton [2003]; Norton, Wang, and Ai [2004]; Cornelissen and Sonderhof [2009]). These authors point out a common mistake, which consists in interpreting the first derivative of the multiplicative term between two explanatory variables as the interaction effect. When studying interactions between two variables (X_1 and X_2), we ask how much the effect of X_1 changes for a unit change in X_2. The effect of X_1, in the marginal effects metric, is the first derivative of the expected value of the dependent variable ($E(Y)$) with respect to X_1, which is an approximation of how much $E(Y)$ changes for a unit change in X_1. To compute the interaction effect, most empirical studies compute the first derivative of $E(Y)$ with respect to the multiplicative term $X_1 * X_2$. Yet, although this intuition is right in linear models, it does not extend to nonlinear models. The interaction effect should be the cross partial derivative of $E(Y)$ with respect to X_1 and X_2, that is, an approximation of how much the derivative of $E(Y)$ with respect to X_1 changes for a unit change in X_2.

This concern can be addressed by several methods depending on the model estimated. For the Cox model, I present hazard ratios rather than marginal effects. As stated in Buis [2010],

> fortunately, we can interpret interactions without referring to any additional program by presenting effects as multiplicative effects (*e.g.* odds ratios, incidence-rate ratios, hazard ratios). However, the marginal effects and multiplicative effects answer subtly different questions, and thus it is a good idea to have both tools in your toolbox.

Hence for the Cox results, I display both multiplicative and marginal effects as will be explained below. For the bivariate probit on the other hand, displaying results as multiplicative effects is not possible, so I will resort to predicted probabilities and their ratios to interpret the effects of these interactions.

5.2 Empirical Results for Cox Analysis

Tables 5 to 7 present the hazard ratios of the covariates for the Cox estimations. All specifications include the basic set of socio-economic explanatory variables, along with controls for the survey waves and census divisions in order to make sure that no phenomenon specific to one year or region could influence the claiming decision in some way. They differ in the way labor status and income variables are introduced, first separately, then together, and finally interacted with one another.

The first and third columns of Table 5 confirm the hierarchy between labor force statuses observed in the descriptive analysis: the unemployed are more likely to claim than part-time workers, and much more likely to claim than full-time workers (the unemployed face a 62% greater hazard than full-time workers, and the odds of claiming are 42% higher for part-time workers than full-time workers). Income quartiles also confirm the monotonic impact that was observed in the descriptive section (see columns (2) and (3)), *i.e.* the more income older individuals have, the less likely they are to claim. The fact that the coefficients of labor force statuses remain almost unaltered when income is controlled for implies that the higher odds of claiming for the unemployed and to a lesser extent for the part-timers do not entirely go through the lack of income. In order to understand if the lack of income drives the behavior of the part-time workers and the unemployed, I decompose the effect of labor force status on claiming hazard by income quartiles. For brevity Table 6 only presents hazard ratios of parameters of interest, *i.e.* the interactions between labor force status and household income quartiles. These are "multiplicative" effects, which have to be compared to the baseline hazard. As the latter is obtained by fixing all covariates to zero, the reference category here is "working full-time" interacted with "first quartile of income". The unemployed and the part-timers at the bottom of the distribution of total household income (in the 1^{st} quartile) have higher odds of claiming than most other groups of the sample, which is consistent with my hypothesis of a strong interaction between labor force status and lack of liquidity being a trigger to claim early SS benefits. As a proportional hazard model, the Cox model does not allow me to see if this effect is stronger at the beginning or toward the end of the spell, because the effect of the covariates is not time-dependent, but descriptive evidence found earlier suggests that this effect must be maximum on short durations. Being unemployed also raises the odds of claiming for the top quartile. Hence it seems that the unemployed have higher incentives to claim when they are short of liquidity but also when they have enough resources to afford delaying. However the latter group may just decide to withdraw from labor force and thus claim at the same time. As it is not possible to investigate retirement and claiming jointly in this framework, the only conclusion we can draw from these results is that income and labor force status considered separately are not sufficient to explain claiming hazards as the interaction is highly significant. In other words low income is a trigger for claiming for the unemployed and part-time workers more than for full-time workers. Likewise, being unemployed or working part-time does not impact the probability of claiming in a homogeneous way: the effect is significant for the first and fourth quartiles for the unemployed, it decreases with income fort part-timers, and for full-time workers, being in the top quartile lowers the odds of claiming.

Table 7 also displays the impact of these interactions, but in the form of "marginal effects", folllowing the terminology used by Buis [2010]. The relative hazard of claiming for part-time workers in the first quartile is around 2, while this figure is only 1.21 for full-time workers. Thus the marginal effect of being a part-time worker (compared to a full-time worker) is 0.83 for individuals in the first quartile. Likewise, the marginal effect of being unemployed is 0.72 for those in the first income quartile. These are called "marginal" effects because they are computed as the difference between the expected hazard of claiming for individuals in the same quartile of income but in distinct labor status, rather than as the derivative of the expected hazard with respect to the corresponding interaction. Marginal and multiplicative effects differ in that the latter are relative to the baseline hazard in their own category, which may vary a lot. For instance, for the unemployed in the fourth quartile of income, I expect to find 2.03 persons who claim for every person who does not, while for the full-time workers in that quartile of income I almost expect one person to claim for every other one who delays. The multiplicative effects control for these differences in baseline hazards between the groups, hence differing results. However, both Tables 6 and 7 are accurate representations of the effect of income and labor force status, and suggest a strong positive effect of being unemployed or part-time worker in the lower quartiles of income on claiming hazards.

A number of other covariates have an interesting influence on the likelihood to claim SS benefits. High educational attainment lowers that hazard by 20 per cent, as a result of a better understanding of SS rules and greater financial literacy (as financial literacy and education are correlated, see Lusardi and Mitchell [2006], or because a better education leads to better jobs that people are less eager to leave. Having some health impairment limiting work multiplies the hazard of claiming by more than 1.2. Indeed those whose health is an obstacle for continuing work are more likely to retire and thus to claim at the same time. Health status has probably much to do with the retirement decision, and indirectly with that of claiming. In contrast, how many years older individuals expect to live may influence both outcomes as those who expect to die soon might want to enjoy their retirement period sooner, and also claim early because they think they will not reach the SS break-even age. Therefore those who estimate their probability to outlive age 75 greater than 50 per cent face a 13 per cent lower hazard than those who are self-confident about their life expectancy. Receiving some private pension income has a positive impact on hazard ratios, which is not surprising as those who already claimed their private pension benefits are likely to be eager to take their SS retirement benefits as well. On the other hand, being covered by an employer-provided health insurance plan leads to delaying claiming. Indeed as older individuals must wait until age 65 to file for Medicare, the availability of health insurance has an important role to play in loosening liquidity constraints of those who would not be able to afford medical care without such insurance, and therefore may induce individuals to retire before qualifying for Medicare at age 65. As stated in Panis, Hurd, Loughran, Zissimopoulos, Haider, Clair, Bugliari, Ilchuk, Lopez, Pantoja, et al. [2002],

> whether they claim early and reduced Social Security benefits will depend in part if they are liquidity constrained. Retiree health insurance can reduce (the risk of) high levels of medical expenditures and thus acts as an increase in wealth. Covered individuals are therefore more likely to finance consumption out of bequeathable wealth and delay claiming benefits.

Though income, wealth, and health status are controlled for, health insurance keeps a significant impact, which is consistent with the interpretation that it is due to the risk of a negative health shock and of an urgent need of liquidity rather than to current liquidity issues or current bad health. Last, wealth also impacts significantly the odds of claiming, but again the pattern is unclear: compared to the fourth quartile, the other quartiles face higher hazards, depending on specifications, but the hazard ratios do not decrease monotonically with wealth, *e.g* being in the third quartile seems to increase claiming hazards more than being in the first one.

One way of evaluating the goodness-of-fit of the above Cox models consists in using Cox-Snell (CS) residuals. It has been shown that if the Cox regression model fits the data well, then the Cox-Snell residuals should have a standard exponential distribution with a hazard function equal to 1 for all t, ans thus the cumulative hazard of the Cox-Snell residuals should be a straight 45-degree line. By estimating the empirical NA cumuative hazard function with the CS residuals along with the data's original censoring variable, it is possible to check if the chosen specifications are good fits, and further which specification fits the data better. Figure 8 plots the NA cumulative hazard function against the CS residuals for the three tested specifications. We observe that all the specifications fit the data pretty correctly. Some variability about the 45-degree line is always expected, especially in the right-hand tail, because of the reduced effective sample caused by prior failures and censoring. Apart from that variability, the model with interactions between labor force status and income quartiles seems to yield a better fit than the other two.

5.3 Cross-Sectional Analysis of the Joint Probability of Claiming and Retiring at age 62

There is little doubt concerning the existence of an interrelation between claiming and retirement decisions. The duration model presented above ignored that issue as it considers claiming as the event causing failure, but does not require claiming to be independent of retiring. In this cross-sectional analysis, I estimate a bivariate probit of the joint probability of claiming and retiring at age 62:

$$Pr(Y_{1i} = 1, Y_{2i} = 1) = \int_{-\infty}^{u_{1i}} \int_{-\infty}^{u_{2i}} \Phi(X_{1i}\beta_1, X_{2i}\beta_2, \rho) du_{1i} du_{2i} \tag{2}$$

where Y_{1i} is a dummy for individual i's claiming and Y_{2i} a dummy for i's retiring, at age 62 for both since the sample is restricted to those who will become "62 enough" by next wave. Likewise, X_{1i} and X_{2i} are the vectors of covariates included in the two separate equations, but in this case they are the same. Φ denotes the bivariate normal cumulative distribution function. ρ is the correlation coefficient of the errors of the two separate equations. If the two equations are related, then ρ is non-null and the two decisions share some common unobserved determinants (taste for leisure, risk aversion, *etc.*). By using this bivariate probit model, I address potential problems of unobserved heterogeneity in the risk of claiming that are transmitted via the retirement process, and the possibility that these determinants are correlated.

The other good thing about this model, if the data is such that the null hypothesis of $\rho = 0$ is rejected, is that it makes it possible to predict the joint probabilities for the four possible outcomes.

5.4 Empirical Results for Joint Estimates of Claiming and Retirement

Though very useful, there are two things that Cox regressions could not do: first, investigate the effect of each covariate on short durations instead of their average effect on global durations; second, study the probability of claiming and staying in the labor force, *i.e.* not retiring. I attempt to remedy these two flaws by estimating jointly SS claiming and retirement at age 62 using a bivariate probit model. The estimates that are presented are the vectors of parameters β_1 and β_2 of equation (2), relative to the probability of claiming and retiring at age 62. Given my research question, I am more interested in implementing a bivariate probit model in order to predict the probability of claiming while not withdrawing from the labor force, and the impact of interactions between labor force status and income quartiles on that predicted probability. Tables 8, 9, and 10 display the results of three distinct specifications of this model (with labor force status in Table 8, income quartiles in Table 9, and interactions between labor force status and income quartiles in Table 10). First thing to notice is that estimating both equations jointly yields better estimations than estimating two separate models. Indeed, the correlation coefficient ρ is positive and highly significant, meaning that the two equations share some common unobserved determinants, which influence both outcomes in the same direction.

Column (1) and (2) of all tables show the estimates of the claiming and retirement equations estimated separately. The marginal effect of being unemployed is positive and significant in the two equations (see Table 8), but it is stronger in both magnitude and significance in the claiming one. Unemployment may affect the two outcomes separately, through lack of income for claiming, and lack of working activity for retirement. But at this stage no such conclusion can be drawn as unemployment might as well increase the probability of retiring because it increases that of claiming, and conversely.

Part-time workers also have higher odds of claiming at age 62, but this effect does not spread to retirement. In other words, part-time workers are not more prone to stop working than those who work full-time although many of them have already reduced the number of hours in their working week, which is a first step toward retirement.

One of the many reasons why this bivariate framework is attractive to model claiming and retirement is that it allows me to decompose the probability of claiming into the probability of claiming and retiring, and that of claiming and not retiring, the latter being the one at the core of the current study. Being unemployed raises the likelihood of claiming and retiring at the same time by 16 per cent. More interesting is the effect of unemployment on the probability of claiming and not retiring. Indeed the probability of claiming of the unemployed is greater than that of full-time workers by 23.8 per cent. Most of this effect (16%) is simultaneous with retirement, but still unemployment also raises by 7.8 per cent the probability of claiming and staying in the labor force. As for working part-time, which did not impact the probability of retiring, its marginal effect of 18.5 per cent is for most of it (14 %) driven by its effect on the probability of claiming and not retiring. Hence compared to full-time workers, both the jobless and part-time workers have a higher probability of claiming, even if it does not imply leaving the labor force, which raises the issue of the role of lack of resources in such phenomenon.

When income quartiles are included in regressions instead of labor force status (see Table 9), the conclusion is more clear-cut: the less income older individuals have, the sooner they will claim , *i.e.* at age 62. The same does not go for retirement. Income quartiles are almost never significant in the retirement equation, suggesting that retirement has probably more to do with taste for leisure, type of occupation, *etc.*, than with financial characteristics. Being in one of the two bottom quartiles (compared to the fourth one) raises the probability of claiming and staying in the labor force by more than 14%. This figure is lower (8 per cent) for the third quartile, but still highly significant. Consequently, lack of income induces people to claim sooner and continue working or looking for work, which is a first step toward showing that individuals use SS retirement benefits as some kind of social insurance that provides them with enough income to finance their consumption while they earn insufficient salaries or look for work.

Now that a clear pattern of claiming relative to income and labor force status has been established, I introduce interactions in the set of explanatory variables in order to check if within each category of income distribution, the labor force status has a discriminant role in the claiming behavior of those who do not withdraw from labor force. The reference group is made of full-time workers who are in the first quartile of household income, so that if the marginal effect of another labor force status interacted with the first quartile too comes up significantly, it will mean that there are some labor-force-status-specific incentives to claim early and stay in the labor force. Table 10 shows that both part-time workers and the unemployed from the first quartile have a greater probability of claiming, but the strongest marginal effect is that of the unemployed (43.3%). This finding is also true for part-time workers from the second and third quartiles. Amongst full-time workers, those from the top quartile are less likely to claim than their counterparts from the first quartile, meaning again that more income leads to delaying SS claiming. In contrast almost none of these interactions has a significant impact on retirement (except for the third quartile interacted with unemployment). Therefore being unemployed and in the first quartile, as well as working part-time and being in the first three quartiles, impacts the probability of claiming and not retiring, but not that of claiming and retiring at the same time. Furthermore, all the impact of unemployment goes through the first quartile, meaning two things. First, the impact of unemployment is restricted to those at the bottom of the income distribution, *i.e.* unemployed individuals will claim more than full-time workers from the first quartile only if they are also in the first quartile. Second, the impact of unemployment goes beyond that of the consequent lack of income since the omitted group is in the first quartile of income too and hence are as much in need of liquidity as the unemployed. The same goes for part-time workers since the first quartile is also more prone to claim and stay in the labor force, but contrary to the pattern of the unemployed, other quartiles have significant effects too. Hence the impact of part-time work depends on how much income individuals have, but is significant and positive for the first three quartiles whereas only the first quartile is significant for the unemployed.

In order to check that these marginal effects of interactions are correct representations of the impact of these interacted variables, I also display in Table 11 the predicted probabilities of all outcomes corresponding to each group. The unemployed from the first quartile of income are the most likely to claim SS benefits at 62 with a 0.85 probability, which is almost twice that of the full-time workers from the first quartile. The latter have a 23% probability of claiming SS benefits and staying in the labor market, while the former have 48% chances to do so. Again, part-time workers and unemployed individuals have higher probabilities of claiming and continuing to work or to look for work than full-time workers, and these probabilities are much higher for the lower quartiles.

These results provide evidence in favor of the social insurance role of Social Security retirement benefits in that low income part-time workers as well as unemployed at the bottom of the income distribution claim more without retiring, and no such effect is observed on retirement, meaning that this claiming decision has financial incentives that are disconnected from retirement motives. Unemployment triggers retirement as well, but only when not interacted with income. The combination of unemployment and low income induces claiming while continuing the job search process, suggesting that this new source of income may help these individuals to stay in the labor market and retire later.

Concerning the other covariates, few variables impact both decisions. This is the case for education, whose impact is negative for both outcomes. High education attainment lowers the probability of claiming by 11%, that of retiring by 5%, probably because these individuals enjoy better working and financial conditions, and therefore are less in a hurry to leave the labor market and/or take SS early benefits, all the more since they may understand better SS rules. Conversely, health limitations raise both probabilities. Private health insurance coverage has opposite effects on the two outcomes. Indeed being covered by some employer-provided health insurance plan has a positive impact on the probability of retiring, probably because many of these plans also cover employees into retirement, but it lowers the probability of claiming, probably due to the loosening of liquidity constraints that it allows. Again, receiving income from a private pension plan highers the probability of claiming, but not that of retiring, and also has a positive impact on the joint probability of claiming and not retiring. As for wealth quartiles, the pattern of claiming and retirement is quite erratic: when labor force status is included instead of income quartiles, the less wealthy individuals are, the more they claim SS benefits without retiring, but this monotonic effect disappears when income is controlled for. This time none of the quartiles impact that joint probability, and only the third quartile has a significant and positive effect on the other probabilities. Thus, if anything, the general impression is that wealth and income play the same role in their influences on claiming behaviour, but the impact of wealth is more unclear, and not robust to the inclusion of income variables.

5.5 Robustness Checks

A few tests could reinforce the insurance interpretation of early SS benefits. First, in order to differentiate between that hypothesis and that of the earnings test providing disincentives to claim if one expects to return to full-time work, I include a subjective measure of these individual expectations (see section 4.4 for details about this variable) in the previous estimations. As explained before, labor force status cannot be included at the same time as this variable is missing for most of non-working individuals. However, income variables are included along with that subjective probability of continuing to work full-time after age 62/65, so that if workers from the bottom income quartiles have higher odds of claiming early and retiring later, including when their expectations about if they will continue full-time work after the earliest age of eligibility are controlled for, then the assumption that they claim early because they need an alternative source of income is no longer challenged by that of the earnings test disincentives to claim early if one expects returning to full-time employment.

Subjective expectations may refer to continuing work after age 62 or age 65, so I create three categorical variables, the first is a dummy for self-estimated expectations of working full-time after 62 greater than 50%, the second one is for expectations of working full-time after 65 greater than 50%, and the third variable is equal to the first one for individuals aged less than 62, and to the second one for individuals between 62 and 65. Table 12 displays the results of Cox regressions with and without these expectation variables. Column (1) shows that the more income individuals have the less they claim. The other three columns confirm that thinking continuing to work after some point leads to delaying the take-up of SS benefits. This result is stronger when expectations refer to age 62, with those who think they have more than 50 per cent chances to work full-time after age 62 facing a 62% lower hazard than those who do not think so. More important is the impact of income quartiles on claiming hazards. Indeed, the hierarchy between income quartiles is still respected once expectations are part of the set of explanatory variables, and hazard rates are even greater than in the reference specification (column (1)). Being in the first quartile of income increases the claiming hazard by 60% in specification (3) compared to the fourth quartile, while this figure is only 32% when subjective expectations about future work are not included (specification (1)).

As for the probit results (see Table 13), high expectations of working full-time after 62 decrease both probabilities of claiming and retiring (marginal effects of -30 and -24%), but impact stronger the claiming decision. The decomposition of this effect (columns (3) and (4)) shows that the negative impact mostly goes through claiming and retiring at the same time. Indeed, those who think they will work full-time after 62 have an 8 per cent lower probability of claiming and not retiring than those who think they will not, which is not much compared to the impact of other variables. Being in the first quartile of income highers that probability by 14.5 per cent compared to being in the fourth quartile. Even if those people from the bottom quartile were more prone to expect stopping working after age 62, and therefore more prone to claim (but not to stay on the labor market) because not affected by potential earnings-test disincentives to claim, this correlation between income quartiles and subjective expectations is controlled for, so the marginal effects of income quartiles go beyond earnings test incentives and disincentives to claim or delay.

Last, as the proportional assumption for the Cox model seemed to be "less" verified for longer durations, I implement PH tests (based on Schoenfeld residuals, or specific to those variables that seemed to invalidate the PH assumption) on durations shorter than 25 months (*i.e.* until the 64^{th} birthday), and reestimate all regressions under this restriction. Graphical tests give evidence in favor of the PH assumption since this time the two curves do not cross each other for high values of analysis time (long durations). The global test of the PH assumption based on Schoenfeld residuals does not reject anymore that assumption. As for the Cox results when durations are restricted to be shorter than 25 months, they confirm and reinforce the role of labor force status and income in the claiming decision. Indeed, Table 14 shows that the claiming decision is affected by the same variables as before, only in a stronger way. An unemployed individual faces twice the claiming hazard rate of a full-time worker, to be compared to a hazard ratio of 1.64 when no restriction on durations were imposed. The same goes for low income, whose effect on claiming hazards is greater when only short durations are considered. Interactions between labor force status and income quartiles give results which seem more in accordance than before with the social insurance role played by early SS benefits. This time being unemployed and in the first quartile of income increases more the odds of claiming than working part-time and being in that same quartile (with hazard ratios being respectively 2.7 and 1.6 compared to full-time workers from the first quartile, see Table 15). Besides, the unemployed from the bottom quartile face a higher claiming hazard than those from the top quartile, which was not the case in Table 6. Finally, Table 16 displays the "marginal" effects of these interactions, and also suggests that the unemployed are those who face the higher claiming hazards, with those from the first quartile having chances to claim that are more than four times those not to claim. For all labor statuses, this marginal effect decreases when income increases; and for (almost) all income quartiles, the unemployed have higher claiming hazards than part-time workers, who in turn claim more than full-time workers. Hence, far from questioning the results found before, focusing on short durations leads to a better understanding of the impact of labor force status and lack of income on the claiming decision. As the unemployed become fewer and fewer when durations increase, it was more difficult to pinpoint the effect of joblessness on claiming hazards. What comes up from the restriction to short durations is a clearcut effect of being unemployed and lacking income on the probability of claiming early, which therefore reinforces the assumption that these individuals use SS early benefits as some kind of social insurance that allows them to finance consumption when unemployment insurance benefits have run out or are simply not enough to pull through.

6 Discussion and Conclusive Remarks

Claiming Social Security involves making a decision: claiming early at the cost of permanently reduced benefits and enjoying this new source of income as early as age 62 versus delaying and collecting higher benefits later and for a shorter period. Some workers choose to claim benefits early and continue working. They may think that "a bird in the hand is better than two in the bush" and be afraid of being made worse off by reforms of the SS system. Or they may want to file for SS benefits and suspend their receipt in order to be able to restart collecting their benefits quickly in case they would lose their job for instance. The picture is quite different for the unemployed. The jobless are more likely to claim early benefits than their working counterparts. This is a typical finding of the outstandingly rich retirement literature. But they are believed to claim early because they retire early. The fact that there is a group of unemployed individuals who claim at age 62 while not exiting the labor force at the same time, meaning that they continue their job search, might give another meaning to the early claiming pattern.

My hypothesis is that when they have no liquidity to finance their consumption while waiting for future higher benefits, the unemployed may use Social Security as a safety net to maintain their lifestyle during their job search process.

In this paper I find evidence of a specific claiming pattern proper to the unemployed and part-time workers. Being unemployed and in the left tail of the income distribution strongly predicts early claiming while not retiring. I also find that low-income part-time workers have a higher probability of claiming and staying in the labor force than low-income full-time workers. Hence part-time workers seem to claim for liquidity purpose too, but I chose to focus on finding evidence of the impact of lack of income on SS claiming for the unemployed, because showing that the jobless already use SS as a form of unemployment insurance participates to building a rationale for integrating Unemployment Insurance with Social Security.

I believe these findings should be taken into account when thinking of the welfare implications of early claiming. Indeed the main concern raised by the massive early claiming phenomenon is that although it is roughly actuarially neutral for public finances, it might lower the living standards of the elderly. As stated in Gruber and Orszag [2000],

> this concern is heightened by the fact that the average annual benefit among older widows whose spouses had claimed early benefits was slightly below the poverty line in 1998, whereas the average annual benefit among older widows whose spouses had not claimed early benefits was more than $1,800 above the poverty line.

This is precisely why the earnings test condition has been maintained between age 62 and the full retirement age, in order to protect the older old against poverty by withholding and hence deferring some part of their benefits until they stop working or reach the FRA. Still, 74 percent of the 33.5 million retired workers currently receive reduced benefits because of entitlement prior to full retirement age. Therefore early entitlement to SS benefits seems to meet urgent needs for many older individuals, which should also be borne in mind when investigating normatively the early claiming issue. The recent worldwide economic crisis has reminded the developed world of the importance of a safety net. With the bulk of savings used for Social Security programs, the amount individuals have at their disposal to ensure themselves against negative income shocks such as unemployment is limited. Besides, capital markets are largely incomplete, which makes it almost imposible for older individuals to borrow against future earnings. As a result older individuals in need of liquidity claim SS benefits as soon as they become eligible, even if it entails leaving some money on the table. This naturally leads to the suggestion of an integrated unemployment and pension program. Indeed, if unemployed individuals had the possibility to draw money from individual accounts filled with their own retirement wealth, it would allow them to use their retirement credits at any moment of their life for short periods of job displacement, finance their job search and participate longer in the workforce. Furthermore the fact that it is their own retirement wealth that they draw down would increase their incentives to find a job contrary to the traditional unemployment insurance that is known to lead to adverse disincentives effects. Hence any policy aiming at forcing individuals to delay the claiming of SS benefits "for their own good" might well be mistaken. As for public finances, the timing of SS claiming is actuarially fair, so that early claiming is neither a bad nor a good thing, except that if it keeps older individuals at work, it can be considered as a boon for a government whose interest is in making older individuals contribute longer to society through payroll taxes for instance.

I believe this framework of thought opens up some very interesting avenues for further research, starting with the need to find evidence of longer durations in the labor force for the unemployed who claimed early compared with those who postponed their claiming. A second step could consist in modelling the job search process in order to compare the outcomes for early claimers and late claimers, and see if those who could use SS benefits as an insurance have a higher probability of finding a job.

7 Appendix

7.1 Institutional Features of Social Security

Benefits are adjusted to produce permanently lower or higher benefits for those who claim before or after the FRA, so that the system is roughly actuarially neutral: they are reduced by 5/9 of one percent for each month they are received prior to the FRA up to 36 months, and 5/12 of one percent thereafter. Hence the formula relating the monthly benefit amount (MBA) to the Primary Insurance amount (PIA) for someone claiming SS benefits between 62 and the full retirement age is:
$MBA = \underbrace{\left[1 - \left(n_1 * \frac{5}{900} + n_2 * \frac{5}{1200}\right)\right]}_{ARF} * PIA$, where n_1 is the number of months before the FRA if the individual claims between 0 and 36 months before the FRA, n_2 is the number of months adding to the first 36 months before the FRA if the individual claims more than 36 months before the FRA, and ARF is the actuarial reduction factor. Thus, claiming at age 62 instead of 66 reduces the monthly benefit by $\left[36 * \frac{5}{900} + 12 * \frac{5}{1200}\right]$ per cent, *i.e.* by 25 per cent. The following table gives the values of the adjustment factor δ_t and the actuarial reduction factor ARF for every age, computed using the formula above.

Table 1: Adjustment and Actuarial Reduction Factors by SS claiming Age

t	ARF	δ_t
62	0.75000	0.06667
63	0.80000	0.08332
64	0.86666	0.07693
65	0.93333	0.07143
66	1.00000	0.08000
67	1.08000	0.07407
68	1.16000	0.06897
69	1.24000	0.06452
70	1.32000	

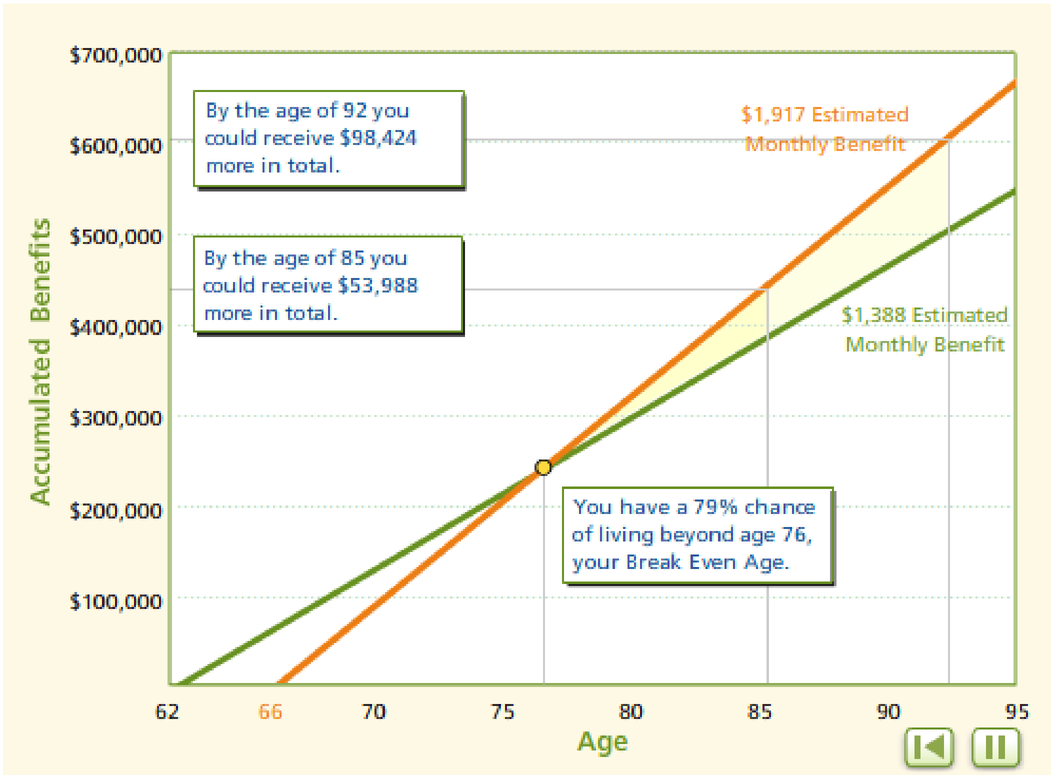
Likewise, the delayed retirement credit has increased substantially over the years, from 1/4 of one percent for those born between 1917 and 1924 to 2/3 of one percent for those born after 1943.

Another particular feature of this institutional structure is that spouses and survivors have the right to become entitled to special Social Security benefits: spousal benefits are payable when they exceed the benefit payable by reason of the woman's own earnings record (married men are also entitled to these benefits but they rarely have much in any value because married men usually have larger PIAs than their wives, and usually pre-decease them). The spousal benefit equals 50 percent of the husband's PIA when claimed at the wife's FRA. She can claim it as early as age 62, provided her husband has already claimed, with a subsequent reduction[6]. In the past, if a worker delayed collecting Social Security, the spouse would not be able to collect spousal benefits and would not be receiving delayed retirement credits either, which reduced the value of delaying Social Security for many couples. Changes made under the Senior Citizens' Freedom to Work Act of 2000 allow a worker to "file and suspend" Social Security benefits once the FRA has been reached, allowing the spouse to begin receiving spousal benefits based on the worker's record while the worker continues to accrue delayed retirement credits. Surviving spouses of retired workers are entitled to a survivor benefit of 100% of the retired worker's benefit, which can be greater or less than his PIA, depending on the age when he first claimed benefit. The benefit can be claimed once the survivor is 60, and is subject to a reduction depending on the survivor's age when benefit begins[7].

[6]Spousal benefit is subject to a reduction of 25/36 of one percent for each month they are received prior to the FRA up to 36 months, and 5/12 of one percent thereafter. There is no delayed retirement credit.

[7]This reduction is of 0.475 percent for each month it is received prior to the wife's FRA for women born in 1939 or earlier, decreasing to 0.339 percent a month for those born in 1962 or later. It is not increased if the husband's death occurs after the wife's FRA.

Figure 1: When should you begin taking your Social Security benefits?



7.2 Claiming Early Vs. Delaying: Analytical Framework

The following equation lines explain how the timing of claiming modifies intertemporal income. Let w_t be the salary earnings at time t, B_t the monthly Soc. Sec. benefits if the individual claims at time t, and δ_t and β the actuarial adjustment factor and the discount rate respectively (which incorporates mortality risk). If the individual, who works at time t, claims and stops working at $t+1$, his present value of total income from time t until his death, is:

$$Y = w_t + \underbrace{\sum_{s=t+1}^{S} \beta^{s-t} B_{t+1}}_{EPDV_1} \tag{3}$$

where $EPDV_1$ is the expected present discounted value of the flow of future benefits from its start until death, and S is the maximum lifespan (*e.g* $S = 120$). If he delays both decisions to time $t+2$, the intertemporal income becomes:

$$Y = w_t + \beta w_{t+1} + \underbrace{\sum_{s=t+2}^{S} \beta^{s-t} B_{t+2}}_{EPDV_2} \tag{4}$$

If the individual dies at the break-even age[8], which is currently 76 or 77 (cf Figure 1), then $SSW_1 = SSW_2$[9]. If he lives beyond that age, then $SSW_1 < SSW_2$, and conversely. What is known for sure is that $B_{t+2} > B_{t+1}$, for two reasons: because w_{t+1} may replace a 0 or a lower year of earnings in the calculation of the Average Indexed Monthly Earnings based upon the highest 35 years of earnings; and due to the actuarial adjustment factor δ_t, which is designed to compensate the forgone year of benefits, in the following way:

$$B_{t+2} = (1 + \delta_t) B_{t+1} \tag{5}$$

Depending on the sign of equation(4) - equation(3), the individual will have incentives to delay (if positive) or claim (if negative).

$$\begin{aligned} equation(4) - equation(3) &= \beta w_{t+1} + \sum_{s=t+2}^{S} \beta^{s-t} B_{t+2} - \sum_{s=t+1}^{S} \beta^{s-t} B_{t+1} \\ &= \beta(w_{t+1} - B_{t+1}) + \sum_{s=t+2}^{S} \delta_t \beta^{s-t} B_{t+1} \end{aligned} \tag{6}$$

This way, individuals will have stronger incentives to delay than to claim early if:

$$\delta_t \sum_{s=t+1}^{S} \beta^{s-t} B_{t+1} \geq B_{t+1} - w_{t+1} \tag{7}$$

Assuming that w_{t+1} corresponds to the wage of an older individual in a full-time occupation at the end of his career, the right-hand side of equation(7) must be negative (cf SS benefits formula), so that this condition holds and working individuals should definitely delay, all the more since their benefits will be highered via the accrual rate and the additional year of earnings.

As there is a trade-off between working longer and enjoying higher benefits for less time, and stopping work but at the cost of lower benefits for more time, how should people react faced to the absence of earnings? In other words, is it still rational to postpone

[8] the "break-even age" is the point at which the cumulative value of early retirement benefits is trumped by the money that would have been paid to the claimant had he waited until his full retirement age.

[9] SSW is the flow of future SS benefits, which corresponds to the expression of EPDV with $\beta = 1$

claiming for an individual without any earnings while waiting? In that case, condition (7) becomes:

$$\begin{gathered}\delta_t \sum_{s=t+1}^{S} \beta^{s-t} B_{t+1} \geq B_{t+1} \\ i.e. \sum_{s=t+1}^{S} \beta^{s-t} \geq \frac{1}{\delta_t}\end{gathered} \tag{8}$$

A quick calculation provides a narrow range of possible values for δ: an individual becoming eligible to early SS benefits in 2010 will reach the FRA at age 66; if he claims at 62 he will receive 75% of his PIA every month until he dies; if he waits for one additional year, he will get 80% of his PIA. Hence equation (5) yields: $0.8PIA = (1+\delta)*0.75PIA$, *i.e.* $\delta_{62} \approx 0.0067$. The same calculation for any one-year delay between age 62 and age 66 drives to similar values for δ_t (See Section 7.1 in the appendix).

Individuals should delay if they perceive the adjustment as more than fair ($\beta \geq \frac{1}{\delta}$). If $\delta = 0.07$ (as calculated before) and $\beta = 0.97$, which is a reasonable value for the discount rate, it takes 20 years for this condition to hold. Therefore in a short-run perspective the individual's year of lost earnings cannot be compensated for by higher future benefits, which will incitep him to claim as soon as possible. If the individual discounts future benefits more strongly, *e.g.* $\beta = 0.95$, because his self-estimated life expectancy is rather low, or his impatience level higher than average, condition (7) remains asserted in the longer run, but the present loss of income matters more to the individual than the future higher stream of income, so that it will take even more than 20 years for him to get the benefits from postponing SS take-up. On the contrary, if he has no aversion for the future, *e.g.* $\beta = 1$, he will beneficiate from delaying after 15 years, which corresponds to the "break-even age" as computed by the Social Security Administration. Besides, this break-even age is underestimated as these calculations do not factor in the investment value of Social Security benefits. Indeed, even if SS benefits are not invested, they allow to pull less from retirement savings, which generates earnings. Assuming a conservative after-tax return of 5 percent, the break-even age increases by 3 years, to age 81, which clearly lowers one's odds to take advantage of delaying at some point. Finally, a similar conclusion applies to workers who suffered a great loss in their earnings, for instance due to some recent job loss, so that their current salary does not reflect their earnings history. Likewise, workers on part-time jobs may experience unusually low earnings compared to what they have earned over their career, which could be a reason why condition (7) does not hold any longer, as their potential Social Security benefits are more generous than their current salary. Hence for some workers too, early claiming may not be such a wrong decision.

These simple calculations show that when taking into account not only Social Security

Wealth (SSW) but the present value of total income (earnings over the considered period plus SSW), it seems no longer irrational to claim early even at the cost of consequently permanently reduced benefits. In a short/medium-run perspective, Social Security benefits may play some insurance role for unemployed individuals as well as for the working poor. The same conclusions can be drawn about wealth: individuals living long enough will gain from delaying provided that they have some source of income or disposable wealth meanwhile.

7.3 Results

Figure 2: Kaplan-Meier Survivor Function

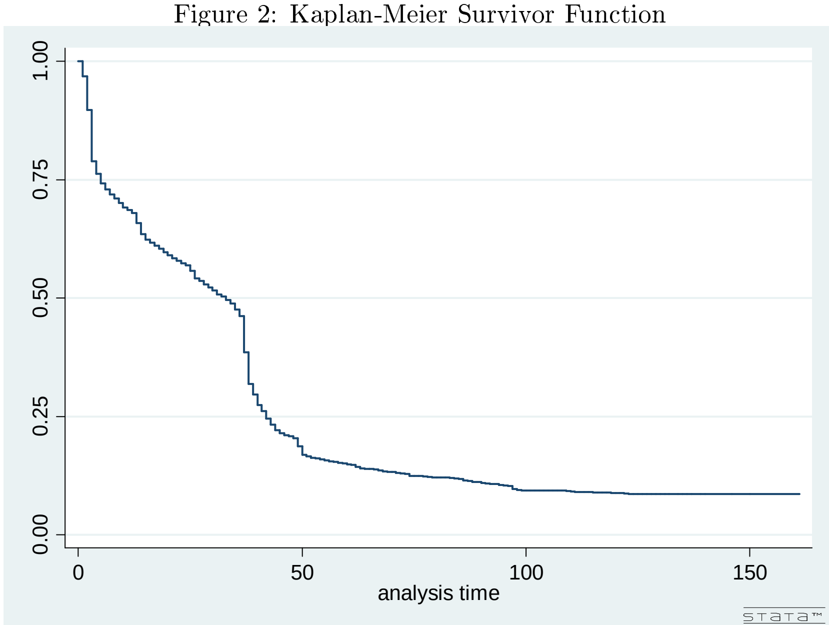


Table 2: Summary Statistics

	Duration Model			Cross-Sectional Model		
Variable	**Mean**	**(S.D.)**	**N**	**Mean**	**(S.D.)**	**N**
male	0.577	(0.494)	7,221	0.554	(0.497)	3,879
marital status: in couple	0.782	(0.413)	7,218	0.788	(0.409)	3,878
education: high attainment	0.461	(0.499)	7,221	0.445	(0.497)	3,879
number of people living in the household	2.36	(1.171)	7,220	2.378	(1.181)	3,879
age	62.034	(2.048)	7,221	60.68	(0.617)	3,879
health: excellent	0.201	(0.401)	7,218	0.201	(0.401)	3,877
health limits work	0.068	(0.252)	6,973	0.074	(0.262)	3,840
subjective proba of living to 75>50	0.645	(0.478)	6,672	0.631	(0.483)	3,717
subj. proba continue work after 62> 50	0.626	(0.484)	3,862	0.597	(0.491)	3,351
subj. proba continue work after 65> 50	0.286	(0.452)	4,603	0.247	(0.432)	3,432
subj. proba continue work after 62/65> 50	0.529	(0.499)	4,606	0.562	(0.496)	3,435
receives pension income	0.102	(0.303)	7,221	0.09	(0.286)	3,879
total household wealth (million$)	0.298	(0.359)	6,973	0.281	(0.341)	3,771
total hh income (hundreds of thousand$)	0.846	(0.647)	7,050	0.812	(0.611)	3,797
worked 10-19 years	0.058	(0.234)	7,221	0.059	(0.235)	3,879
worked 20-29 years	0.114	(0.317)	7,221	0.121	(0.326)	3,879
worked 30-39 years	0.205	(0.404)	7,221	0.233	(0.423)	3,879
worked 40-49 years	0.583	(0.493)	7,221	0.588	(0.492)	3,879
worked over 50 years	0.04	(0.195)	7,221	0	(0)	3,879
works FT	0.843	(0.364)	7,221	0.831	(0.375)	3,879
works PT	0.139	(0.346)	7,221	0.146	(0.353)	3,879
unemployed	0.018	(0.132)	7,221	0.023	(0.151)	3,879

Table 3: Distribution of claiming spells

Sample	**Nb Subjects**	**Final Exit Time**		**Nb Failures(%)**
		mean	median	
works FT	3,850	27.4	25	2,853 (74)
works PT	855	32.09	17	514 (60.1)
unemployed	127	17.65	9	78 (61.4)
1st quartile of hh income	474	26.21	15	282 (59.5)
2nd quartile of hh income	966	27.41	20	593 (61.4)
3rd quartile of hh income	1,716	25.84	19	1,108 (64.6)
4th quartile of hh income	2,142	29	26	1,400 (65.3)
1st quartile of total wealth	893	26.71	20	576 (64.5)
2nd quartile of total wealth	1,397	25.06	19	886 (63.4)
3rd quartile of total wealth	1,543	26.61	22	974 (63.1)
4th quartile of total wealth	1,457	30.26	26	910 (62.5)
Total	4,603	28.1	23	3,445 (74.8)

Figure 3: Hazard Contribution-Non-Parametric

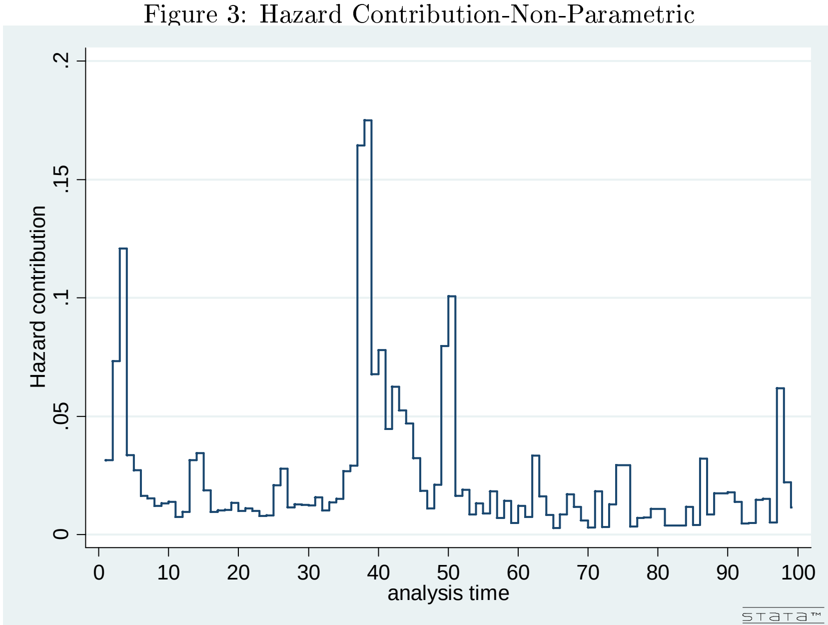


Table 4: Summary statistics on early vs delayed claiming by labor force status

	Delay		**Claim**		**Total**	
Labor Force Status	No.	Row %	No.	Row %	No.	Row %
works ft	2,026	64.09	1,135	35.91	3,161	100.00
works pt	241	43.42	314	56.58	555	100.00
unemployed	35	38.89	55	61.11	90	100.00
Total	2,302	60.48	1,504	39.52	3,806	100.00
Total hh Income	No.	Row %	No.	Row %	No.	Row %
1st quartile	152	49.67	154	50.33	306	100.00
2nd quartile	342	53.27	300	46.73	642	100.00
3rd quartile	677	56.51	521	43.49	1,198	100.00
4th quartile	1,071	67.83	508	32.17	1,579	100.00
Total	2,242	60.19	1,483	39.81	3,725	100.00
Total hh Wealth	No.	Row %	No.	Row %	No.	Row %
1st quartile	376	59.49	256	40.51	632	100.00
2nd quartile	583	58.01	422	41.99	1,005	100.00
3rd quartile	578	56.34	448	43.66	1,026	100.00
4th quartile	686	66.22	350	33.78	1,036	100.00
Total	2,223	60.10	1,476	39.90	3,699	100.00

Figure 4: Survivor Functions, by Labor Force Status

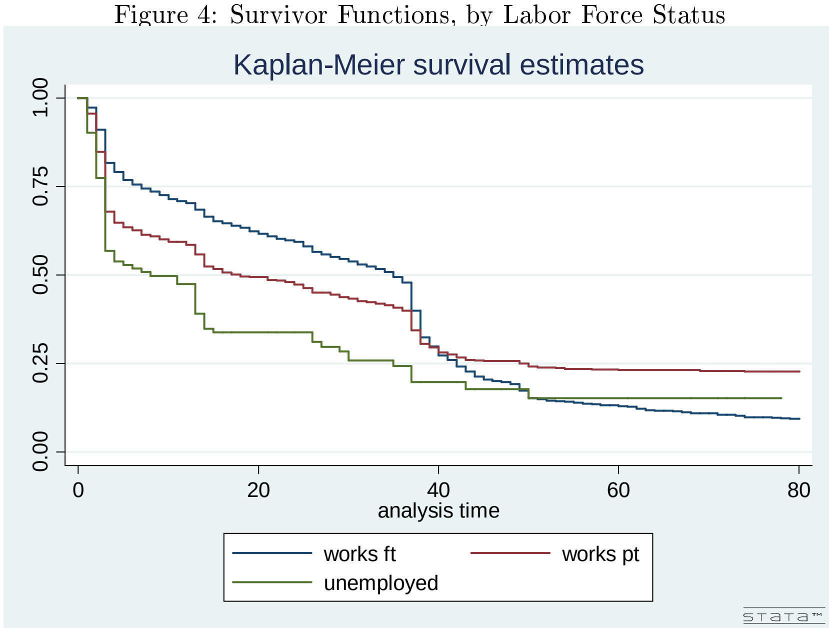


Figure 5: Survivor Functions, by Income and Wealth

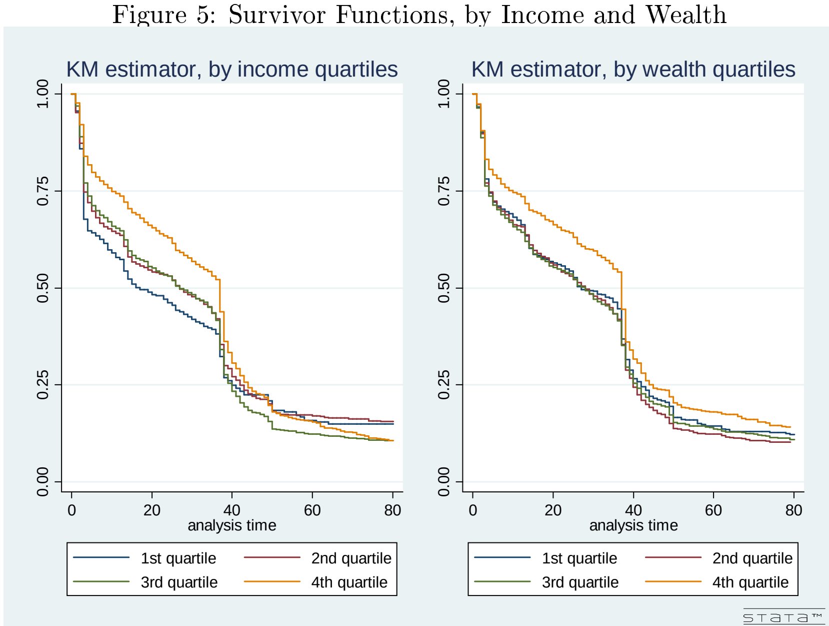


Figure 6: Test of PH assumption

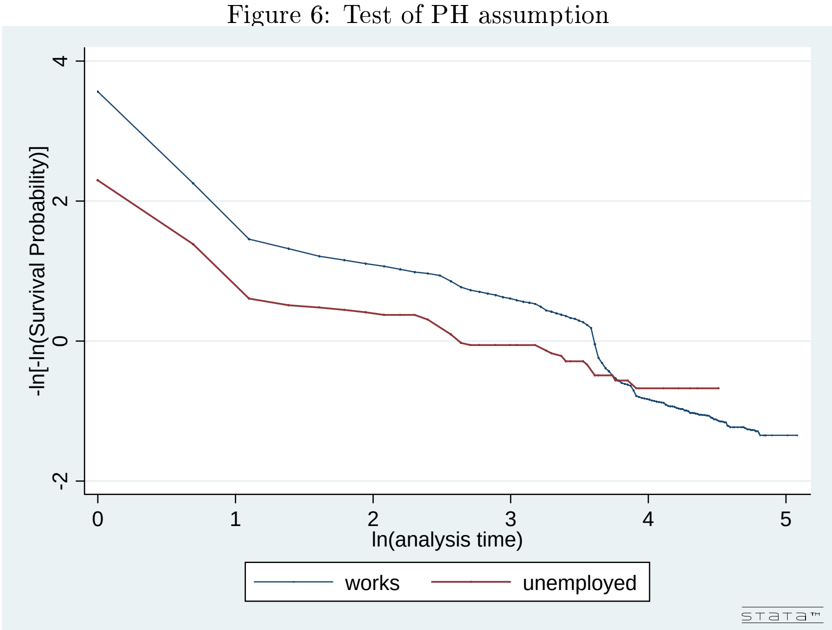


Figure 7: Test of PH assumption

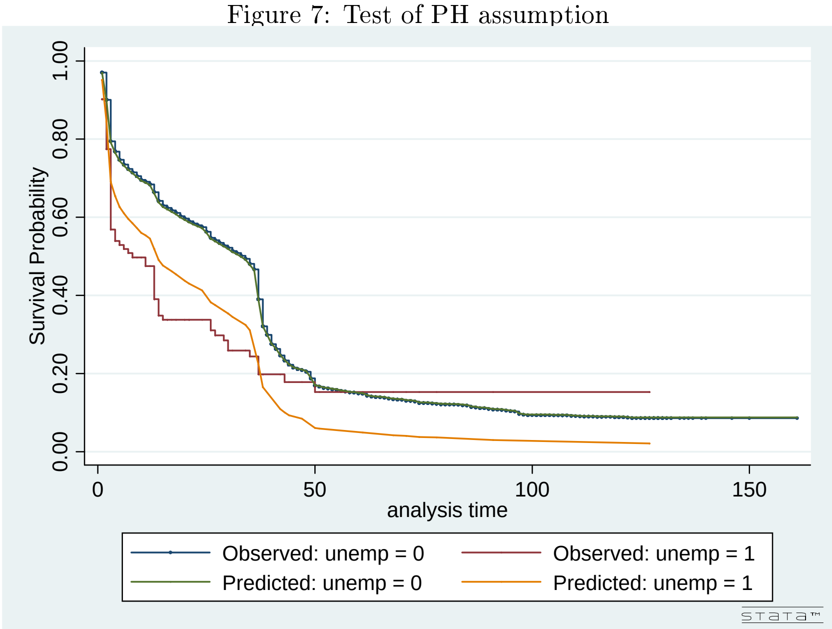


Figure 8: Test of Goodness-of-fit

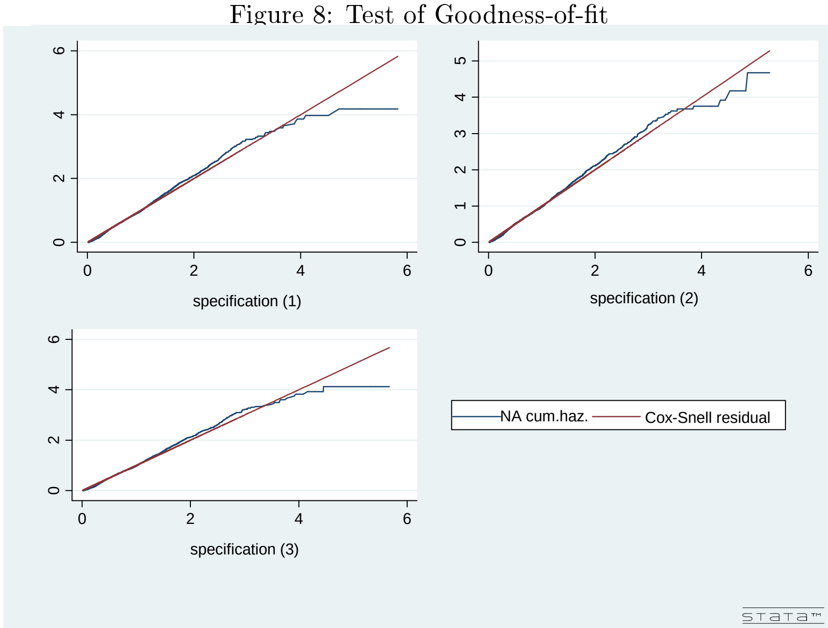


Table 5: SS take-up hazard estimates from Cox regressions

	(1)	(2)	(3)
male	0.896**	0.861***	0.902**
	(-2.54)	(-3.51)	(-2.36)
education: high attainment	0.783***	0.810***	0.808***
	(-6.25)	(-5.19)	(-5.25)
marital status: in couple	1.205***	1.311***	1.274***
	(3.64)	(4.98)	(4.45)
number of people living in the household	0.941***	0.935***	0.939***
	(-3.47)	(-3.79)	(-3.54)
health: excellent	0.929	0.943	0.946
	(-1.50)	(-1.18)	(-1.13)
health limits work	1.223***	1.228***	1.211***
	(2.96)	(3.02)	(2.82)
subjective proba of living to 75>50	0.867***	0.879***	0.874***
	(-3.73)	(-3.35)	(-3.47)
receives pension income	1.114*	1.143**	1.121*
	(1.78)	(2.19)	(1.88)
covered by private hlth insurance	0.883***	0.837***	0.892***
	(-3.00)	(-4.37)	(-2.71)
worked 10-19 years	0.662***	0.685***	0.639***
	(-4.93)	(-4.53)	(-5.31)
worked 20-29 years	0.937	0.936	0.921
	(-1.05)	(-1.06)	(-1.32)
worked 30-39 years	0.908**	0.919*	0.908*
	(-1.96)	(-1.70)	(-1.94)
worked over 40 years	*ref.*	*ref.*	*ref.*
first quartile of total wealth	1.079	0.979	0.987
	(1.25)	(-0.34)	(-0.21)
second quartile of total wealth	1.138**	1.054	1.059
	(2.47)	(0.96)	(1.05)
third quartile of total wealth	1.152***	1.111**	1.109**
	(2.88)	(2.09)	(2.06)
fourth quartile of total wealth	*ref.*	*ref.*	*ref.*
works FT	*ref.*	*ref.*	*ref.*
works PT	1.417***		1.409***
	(6.24)		(6.10)
unemployed	1.624***		1.586***
	(4.06)		(3.85)
first quartile of hh income		1.323***	1.277***
		(3.47)	(3.02)
second quartile of hh income		1.241***	1.216***
		(3.54)	(3.20)
third quartile of hh income		1.194***	1.189***
		(3.85)	(3.75)
fourth quartile of hh income		*ref.*	*ref.*
Observations	6,273	6,193	6,193

Hazard ratios; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: SS take-up hazard estimates from Cox regressions: Impact of labor force status*income quartiles (multiplicative effects)

	hazard ratios	t
works FT*1st quartile	*ref.*	
works FT*2nd quartile	1.008	(0.08)
works FT*3rd quartile	1.004	(0.05)
works FT*4th quartile	0.828**	(-2.05)
works PT*1st quartile	1.758***	(3.87)
works PT*2nd quartile	1.498***	(3.11)
works PT*3rd quartile	1.260*	(1.89)
works PT*4th quartile	1.146	(1.14)
unemployed*1st quartile	1.693**	(2.24)
unemployed*2nd quartile	1.293	(1.01)
unemployed*3rd quartile	1.373	(1.16)
unemployed*4th quartile	1.764**	(2.50)

Hazard ratios; t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Controls included: same as Table 5

Table 7: SS take-up hazard estimates from Cox regressions: Impact of labor force status*income quartiles (marginal effects)

	Relative hazard	s.e
works FT*1st quartile	1.206	0.154
works FT*2nd quartile	1.232	0.193
works FT*3rd quartile	1.259	0.193
works FT*4th quartile	0.991	0.151
works PT*1st quartile	2.034	0.393
works PT*2nd quartile	1.971	0.358
works PT*3rd quartile	1.660	0.289
works PT*4th quartile	1.409	0.239
unemployed*1st quartile	1.923	0.520
unemployed*2nd quartile	1.664	0.472
unemployed*3rd quartile	1.710	0.511
unemployed*4th quartile	2.029	0.521

Hazard ratios; standard errors beside; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Controls included: same as Table 5

Table 8: Bivariate Probit Estimates, with Labor Force Status

	(1) P(Claim=1)	(2) P(Retire=1)	(3) P(Cl=1,Ret=1)	(4) P(Cl=1,Ret=0)
male	-0.042**	-0.011	-0.015	-0.027*
	(-2.10)	(-0.67)	(-1.14)	(-1.82)
education: high attainment	-0.126***	-0.051***	-0.058***	-0.067***
	(-7.04)	(-3.44)	(-4.85)	(-5.16)
marital status: in couple	0.081***	0.026	0.033**	0.048***
	(3.57)	(1.37)	(2.22)	(2.98)
number of people living in the household	-0.027***	-0.001	-0.006	-0.021***
	(-3.33)	(-0.17)	(-1.09)	(-3.56)
health: excellent	-0.047**	-0.068***	-0.055***	0.009
	(-2.13)	(-4.08)	(-4.04)	(0.52)
health limits work	0.068**	0.044	0.044*	0.024
	(2.05)	(1.58)	(1.84)	(0.98)
subjective proba of living to 75>50	-0.027	-0.021	-0.020	-0.007
	(-1.47)	(-1.44)	(-1.60)	(-0.52)
receives pension income	0.075**	0.015	0.023	0.052**
	(2.42)	(0.58)	(1.08)	(2.18)
covered by private hlth insurance	-0.088***	0.047***	0.019	-0.107***
	(-4.54)	(3.05)	(1.46)	(-7.07)
worked 10-19 years	-0.043	-0.066**	-0.053**	0.010
	(-1.15)	(-2.35)	(-2.33)	(0.34)
worked 20-29 years	-0.037	0.051**	0.024	-0.061***
	(-1.31)	(2.04)	(1.23)	(-3.30)
worked 30-39 years	-0.037*	-0.001	-0.008	-0.029*
	(-1.71)	(-0.08)	(-0.56)	(-1.86)
worked 40-49 years	*ref.*	*ref.*	*ref.*	*ref.*
first quartile of total wealth	0.035	-0.044**	-0.026	0.061***
	(1.19)	(-2.01)	(-1.41)	(2.68)
second quartile of total wealth	0.049**	-0.003	0.007	0.042**
	(1.98)	(-0.13)	(0.41)	(2.25)
third quartile of total wealth	0.084***	0.053***	0.053***	0.031*
	(3.51)	(2.62)	(3.10)	(1.78)
fourth quartile of total wealth	*ref.*	*ref.*	*ref.*	*ref.*
works FT	*ref.*	*ref.*	*ref.*	*ref.*
works PT	0.185***	0.021	0.043**	0.141***
	(6.93)	(0.92)	(2.15)	(6.27)
unemployed	0.238***	0.154***	0.160***	0.078*
	(4.37)	(2.85)	(3.24)	(1.75)
rho		0.762		
s.e (rho)		(0.017)		
Observations		3,458		

Marginal effects; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Bivariate Probit Estimates, with Income

	(1) P(Claim=1)	(2) P(Retire=1)	(3) P(Cl=1,Ret=1)	(4) P(Cl=1,Ret=0)
male	-0.063***	-0.014	-0.021	-0.042***
	(-3.19)	(-0.86)	(-1.59)	(-2.87)
education: high attainment	-0.106***	-0.054***	-0.057***	-0.049***
	(-5.71)	(-3.52)	(-4.53)	(-3.63)
marital status: in couple	0.128***	0.028	0.045***	0.084***
	(5.56)	(1.43)	(2.93)	(5.22)
number of people living in the household	-0.027***	-0.003	-0.007	-0.020***
	(-3.32)	(-0.44)	(-1.29)	(-3.35)
health: excellent	-0.036	-0.070***	-0.056***	0.019
	(-1.63)	(-4.19)	(-3.99)	(1.13)
health limits work	0.074**	0.048*	0.048**	0.026
	(2.22)	(1.70)	(1.97)	(1.05)
subjective proba of living to 75>50	-0.019	-0.021	-0.018	-0.000
	(-1.02)	(-1.41)	(-1.46)	(-0.02)
receives pension income	0.076**	0.016	0.024	0.052**
	(2.43)	(0.61)	(1.10)	(2.15)
covered by private hlth insurance	-0.111***	0.038**	0.009	-0.120***
	(-5.79)	(2.45)	(0.70)	(-7.97)
worked 10-19 years	-0.020	-0.059**	-0.045*	0.025
	(-0.54)	(-2.05)	(-1.90)	(0.83)
worked 20-29 years	-0.024	0.054**	0.030	-0.054***
	(-0.85)	(2.12)	(1.46)	(-2.86)
worked 30-39 years	-0.034	0.003	-0.005	-0.029*
	(-1.55)	(0.14)	(-0.33)	(-1.85)
worked 40-49 years	*ref.*	*ref.*	*ref.*	*ref.*
first quartile of total wealth	-0.034	-0.038	-0.033*	-0.002
	(-1.15)	(-1.60)	(-1.67)	(-0.07)
second quartile of total wealth	0.001	0.006	0.004	-0.003
	(0.05)	(0.28)	(0.25)	(-0.17)
third quartile of total wealth	0.059**	0.054***	0.048***	0.010
	(2.42)	(2.60)	(2.81)	(0.58)
fourth quartile of total wealth	*ref.*	*ref.*	*ref.*	*ref.*
first quartile of hh income	0.194***	0.028	0.049*	0.144***
	(5.05)	(0.87)	(1.66)	(4.49)
second quartile of hh income	0.130***	-0.039*	-0.012	0.142***
	(4.43)	(-1.80)	(-0.60)	(5.94)
third quartile of hh income	0.081***	-0.024	-0.003	0.084***
	(3.69)	(-1.35)	(-0.21)	(5.06)
fourth quartile of hh income	*ref.*	*ref.*	*ref.*	*ref.*
rho		0.769		
s.e (rho)		(0.017)		
Observations		3,414		

Marginal effects; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Bivariate Probit Estimates

	(1) P(Claim=1)	(2) P(Retire=1)	(3) P(Cl=1,Ret=1)	(4) P(Cl=1,Re=0)
works FT*1st quartile	*ref.*	*ref.*	*ref.*	*ref.*
works FT*2nd quartile	-0.031	-0.051	-0.042	0.010
	(-0.75)	(-1.60)	(-1.56)	(0.32)
works FT*3rd quartile	-0.053	-0.032	-0.032	-0.021
	(-1.31)	(-0.98)	(-1.19)	(-0.70)
works FT*4th quartile	-0.123***	-0.001	-0.026	-0.098***
	(-2.99)	(-0.04)	(-0.90)	(-3.37)
works PT*1st quartile	0.223***	0.076	0.093	0.130**
	(3.35)	(1.22)	(1.60)	(2.25)
works PT*2nd quartile	0.286***	-0.031	-0.000	0.286***
	(4.46)	(-0.62)	(-0.01)	(4.55)
works PT*3rd quartile	0.116**	0.001	0.018	0.098**
	(1.97)	(0.03)	(0.42)	(2.04)
works PT*4th quartile	-0.024	-0.012	-0.013	-0.011
	(-0.44)	(-0.27)	(-0.35)	(-0.28)
unemployed*1st quartile	0.433***	0.139	0.168	0.266**
	(4.24)	(1.14)	(1.40)	(2.06)
unemployed*2nd quartile	0.119	0.143	0.126	-0.007
	(1.05)	(1.32)	(1.33)	(-0.09)
unemployed*3rd quartile	0.119	0.219*	0.174	-0.055
	(0.95)	(1.73)	(1.60)	(-0.74)
unemployed*4th quartile	0.111	0.042	0.050	0.061
	(1.08)	(0.47)	(0.63)	(0.75)
rho		0.772		
s.e (rho)		(0.017)		
Observations		3414		

Same controls as in Tables 8 and 9
Marginal effects; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Predicted Probabilities of the Joint Outcomes from Bivariate Probit

	(1) P(Claim=1)	(2) P(Retire=1)	(3) P(Cl=1,Ret=1)	(4) P(Cl=1,Ret=0)
works FT*1st quartile	0.432	0.229	0.201	0.231
	(0.039)	(0.033)	(0.028)	(0.030)
works FT*2nd quartile	0.400	0.177	0.157	0.243
	(0.025)	(0.018)	(0.016)	(0.020)
works FT*3rd quartile	0.379	0.196	0.169	0.210
	(0.016)	(0.013)	(0.011)	(0.013)
works FT*4th quartile	0.309	0.228	0.173	0.136
	(0.015)	(0.014)	(0.011)	(0.010)
works PT*1st quartile	0.654	0.308	0.296	0.358
	(0.056)	(0.056)	(0.053)	(0.051)
works PT*2nd quartile	0.714	0.197	0.195	0.518
	(0.050)	(0.043)	(0.042)	(0.054)
works PT*3rd quartile	0.550	0.230	0.218	0.332
	(0.044)	(0.036)	(0.033)	(0.038)
works PT*4th quartile	0.407	0.216	0.188	0.220
	(0.039)	(0.033)	(0.028)	(0.030)
unemployed*1st quartile	0.849	0.372	0.370	0.479
	(0.089)	(0.120)	(0.118)	(0.123)
unemployed*2nd quartile	0.553	0.377	0.334	0.218
	(0.107)	(0.104)	(0.093)	(0.074)
unemployed*3rd quartile	0.553	0.453	0.387	0.166
	(0.119)	(0.121)	(0.107)	(0.073)
unemployed*4th quartile	0.544	0.273	0.253	0.292
	(0.094)	(0.085)	(0.077)	(0.077)

These figures are predicted probabilities, not marginal effects; standard errors in parenthesis
Other covariates are held at their means.

Table 12: SS take-up hazard estimates from Cox regressions-with controls for expectations

	(1)	(2)	(3)	(4)
first quartile of hh income	1.323***	1.521***	1.598***	1.524***
	(3.47)	(3.90)	(4.70)	(4.21)
second quartile of hh income	1.241***	1.375***	1.319***	1.273***
	(3.54)	(3.75)	(3.57)	(3.11)
third quartile of hh income	1.194***	1.299***	1.270***	1.271***
	(3.85)	(3.90)	(4.02)	(4.04)
fourth quartile of hh income	*ref.*	*ref.*	*ref.*	*ref.*
subj. proba continue work after 62>50		0.378***		
		(-17.71)		
subj. proba continue work after 65>50			0.523***	
			(-10.53)	
subj. proba continue work after 62/65>50				0.474***
				(-15.05)
Observations	6,193	3,575	4,233	4,235

Hazard ratios; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 13: Bivariate Probit Estimates-with controls for expectations

	(1) P(Claim=1)	(2) P(Retire=1)	(3) P(Cl=1,Ret=1)	(4) P(Cl=1,Ret=0)
male	-0.047**	0.002	-0.007	-0.040**
	(-2.18)	(0.12)	(-0.52)	(-2.45)
education: high attainment	-0.083***	-0.026*	-0.033***	-0.051***
	(-4.19)	(-1.67)	(-2.59)	(-3.40)
marital status: in couple	0.096***	-0.010	0.013	0.082***
	(3.79)	(-0.45)	(0.82)	(4.60)
number of people living in the household	-0.021**	0.003	-0.002	-0.019***
	(-2.43)	(0.49)	(-0.29)	(-3.00)
health: excellent	-0.016	-0.062***	-0.046***	0.030
	(-0.66)	(-3.59)	(-3.24)	(1.58)
health limits work	0.036	0.031	0.028	0.008
	(1.02)	(1.09)	(1.19)	(0.31)
subjective proba of living to 75>50	0.013	0.001	0.003	0.010
	(0.67)	(0.07)	(0.25)	(0.68)
receives pension income	0.068**	0.000	0.011	0.057**
	(2.04)	(0.02)	(0.52)	(2.16)
covered by private hlth insurance	-0.113***	0.043***	0.013	-0.127***
	(-5.43)	(2.74)	(1.01)	(-7.53)
worked 10-19 years	-0.072*	-0.063**	-0.054**	-0.018
	(-1.87)	(-2.24)	(-2.48)	(-0.59)
worked 20-29 years	-0.033	0.052**	0.026	-0.059***
	(-1.11)	(2.00)	(1.28)	(-2.91)
worked 30-39 years	-0.043*	0.008	-0.003	-0.040**
	(-1.84)	(0.39)	(-0.22)	(-2.32)
worked 40-49 years	*ref.*	*ref.*	*ref.*	*ref.*
first quartile of total wealth	-0.030	-0.040*	-0.033*	0.003
	(-0.93)	(-1.65)	(-1.66)	(0.11)
second quartile of total wealth	0.021	0.009	0.010	0.011
	(0.74)	(0.38)	(0.53)	(0.53)
third quartile of total wealth	0.067**	0.060***	0.053***	0.014
	(2.57)	(2.76)	(3.01)	(0.72)
fourth quartile of total wealth	*ref.*	*ref.*	*ref.*	*ref.*
first quartile of hh income	0.184***	0.019	0.040	0.145***
	(4.36)	(0.55)	(1.30)	(4.04)
second quartile of hh income	0.140***	-0.038*	-0.009	0.150***
	(4.39)	(-1.70)	(-0.48)	(5.64)
third quartile of hh income	0.083***	-0.027	-0.005	0.088***
	(3.49)	(-1.50)	(-0.35)	(4.78)
fourth quartile of hh income	*ref.*	*ref.*	*ref.*	*ref.*
subj. proba continue work after 62>50	-0.304***	-0.238***	-0.222***	-0.082***
	(-16.72)	(-14.92)	(-16.30)	(-5.86)
rho		0.741		
s.e (rho)		(0.019)		
Observations		3,070		

Marginal effects; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 14: SS take-up hazard estimates from Cox regressions-Restricted to short durations

	(1)	(2)	(3)
male	0.933	0.871**	0.930
	(-1.21)	(-2.45)	(-1.26)
education: high attainment	0.697***	0.752***	0.740***
	(-6.78)	(-5.15)	(-5.45)
marital status: in couple	1.218***	1.393***	1.340***
	(2.85)	(4.58)	(4.02)
number of people living in the household	0.949**	0.942**	0.948**
	(-2.27)	(-2.56)	(-2.32)
health: excellent	0.863**	0.882*	0.880*
	(-2.21)	(-1.87)	(-1.91)
health limits work	1.196**	1.219**	1.191**
	(2.10)	(2.33)	(2.06)
subjective proba of living to 75>50	0.921	0.940	0.934
	(-1.64)	(-1.23)	(-1.35)
receives pension income	1.181**	1.206**	1.192**
	(2.05)	(2.29)	(2.15)
covered by private hlth insurance	0.748***	0.685***	0.760***
	(-5.48)	(-7.31)	(-5.11)
worked 10-19 years	0.974	1.024	0.935
	(-0.25)	(0.23)	(-0.65)
worked 20-29 years	0.924	0.948	0.901
	(-0.99)	(-0.66)	(-1.29)
worked 30-39 years	0.886*	0.898*	0.882*
	(-1.86)	(-1.65)	(-1.92)
worked over 40 years	*ref.*	*ref.*	*ref.*
first quartile of total wealth	1.136	0.944	0.958
	(1.56)	(-0.66)	(-0.49)
second quartile of total wealth	1.197**	1.061	1.060
	(2.54)	(0.80)	(0.78)
third quartile of total wealth	1.304***	1.201***	1.216***
	(3.90)	(2.64)	(2.81)
fourth quartile of total wealth	*ref.*	*ref.*	*ref.*
works FT	*ref.*	*ref.*	*ref.*
works PT	1.663***		1.637***
	(7.57)		(7.26)
unemployed	1.976***		1.947***
	(5.15)		(5.03)
first quartile of hh income		1.660***	1.546***
		(5.11)	(4.34)
second quartile of hh income		1.407***	1.377***
		(4.31)	(4.06)
third quartile of hh income		1.275***	1.283***
		(3.94)	(4.03)
fourth quartile of hh income		*ref.*	*ref.*
Observations	3,694	3,647	3,647

Hazard ratios; t statistics in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 15: SS take-up hazard estimates from Cox regressions: Impact of labor force status*income quartiles (multiplicative effects)- Restricted to short durations

	hazard ratios	t
works FT*1st quartile	*ref.*	
works FT*2nd quartile	0.895	(-0.93)
works FT*3rd quartile	0.848	(-1.47)
works FT*4th quartile	0.682***	(-3.23)
works PT*1st quartile	1.652***	(3.02)
works PT*2nd quartile	1.627***	(3.14)
works PT*3rd quartile	1.535***	(2.92)
works PT*4th quartile	0.960	(-0.27)
unemployed*1st quartile	2.698***	(3.72)
unemployed*2nd quartile	1.782**	(2.12)
unemployed*3rd quartile	1.202	(0.63)
unemployed*4th quartile	1.371	(1.18)

Hazard ratios; t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Controls included: same as Table 5

Table 16: SS take-up hazard estimates from Cox regressions: Interaction Effects (marginal effects)-Restricted to short durations

	Relative hazard	s.e
works FT*1st quartile	1.448	0.273
works FT*2nd quartile	1.231	0.275
works FT*3rd quartile	1.215	0.266
works FT*4th quartile	0.913	0.199
works PT*1st quartile	2.285	0.570
works PT*2nd quartile	2.654	0.643
works PT*3rd quartile	2.548	0.604
works PT*4th quartile	1.379	0.325
unemployed*1st quartile	4.164	1.371
unemployed*2nd quartile	2.898	0.959
unemployed*3rd quartile	2.084	0.715
unemployed*4th quartile	1.910	0.617

Hazard ratios; standard errors beside; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Controls included: same as Table 5

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