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**How did the Elimination of the Earnings Test above the Normal Retirement Age affect Retirement Expectations?**

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**SEDAP Research Paper No. 174**

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# How did the Elimination of the Earnings Test above the Normal Retirement Age affect Retirement Expectations? [1]

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**Abstract:**
We look at the effect of the 2000 repeal of the earnings test above the normal retirement age on retirement expectations of workers in the Health and Retirement Study, aged 51 to 61 in 1992. For men, we find that those whose marginal wage rate increased when the earnings test was repealed, had the largest increase in the probability to work full-time past normal retirement age. We do not find significant evidence of effects of the repeal of the earnings test on the probability to work past age 62 or the expected claiming age. On the other hand, for those reaching the normal retirement age, deviations between the age at which Social Security benefits are actually claimed and the previously reported expected age are more negative in 2000 than in 1998. Since our calculations show that the tax introduced by the earnings test was small when accounting for actuarial benefit adjustments and differential mortality, our results suggest that although male workers form expectations in a way consistent with forward-looking behavior, they misperceive the complicated rules of the earnings test. Results for females suggest similar patterns but estimates are imprecise.

**Keywords:** Social security earnings test, expectations, retirement, difference in differences, panel data

**JEL codes:** H55, J22

**Résumé:**
Nous examinons l'effet de l'abrogation de l'évaluation des revenus au-delà de l'âge normal de la retraite sur les intentions de départ à la retraite des ouvriers âgés de 51 et 61 ans en 1992 dans l'enquête américaine du « Health and Retirement Study ». Chez les hommes, nous constatons que ceux dont le salaire horaire marginal a augmenté quand l'évaluation des revenus a été abrogée, ont enregistré la plus forte hausse de la probabilité de continuer à travailler à temps plein au-delà de l'âge normal de la retraite. Nous ne trouvons pas d'effets significatifs supportant que l'abrogation de l'évaluation des revenus ait entraîné une hausse de la probabilité de continuer à travailler au-delà de l'âge de 62 ans ou à l'âge anticipé de la collecte de prestation des droits. D'autre part, pour ceux qui atteignent l'âge normal de la retraite, les écarts entre l'âge auquel les prestations de la sécurité sociale sont réclamées réellement et les intentions précédemment rapportées sont plus importants en 2000 qu'en 1998. Puisque nos calculs démontrent que la taxe induite par l'évaluation du revenu était modeste, dès que nous prenons en compte l'ajustement actuariel des prestations et le différentiel de mortalité, nos résultats suggèrent que bien que les ouvriers de sexe masculin semblent former leurs anticipations de façon apparemment rationnelle, ils perçoivent de façon erronée les règles compliquées du système de l'évaluation des revenus. Chez les femmes, nos résultats suggèrent un comportement semblable mais nos estimations sont imprécises.

# 1. Introduction

While several papers study the effect of the social security earnings test on actual retirement (e.g., Leonesio, 1990; Gruber and Orszag, 2003; Haider and Loughran, 2005), little is known about how workers in their late fifties or early sixties adjust their retirement plans and expectations in response to such an earnings test, which taxes away earnings later in life. The Senior Citizens' Freedom to Work Act of 2000, which eliminated the earnings test for workers aged 65 to 69, provides an excellent opportunity to look at this issue, involving a change in the effective tax structure across age groups.

Recent studies find significant responses to the earnings test in terms of labor supply, claiming of benefits, and "bunching" of workers' earnings at the minimum exempt amount (Friedberg, 2000; Tran, 2004; Song, 2004; Haider and Loughran, 2005). This is surprising at first sight since benefits lost due to the earnings test are reimbursed at a later age through an actuarial adjustment. This adjustment is generally believed to be actuarially fair for recent cohorts. One interpretation is that the adjustment is be misunderstood (Benitez-Silva and Heiland, 2005). Another interpretation of these effects is that workers are myopic instead of forward looking. A necessary condition for workers to be forward-looking is that their expectations of future behavior respond to changes in the incentive structure over the life-cycle. If forward looking workers in their late fifties and early sixties are aware of the repeal of the earnings test, their expectations concerning future labor market behavior may change. They may also change their current behavior since, for example, maximizing lifetime utility implies intertemporal substitution of labor supply. In the end, the consequences of the earnings test depend on its disincentive effects on lifetime labor supply and wealth.[3]

This paper first documents the size of the taxes induced by the earnings test in the population covered by the Health and Retirement Study, using administrative earnings records from the Social Security Administration. These calculations take account of the actuarial adjustment and allow for differential mortality profiles exploiting heterogeneous subjective survival probabilities elicited in the HRS. This helps gauge how big the

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[3] Another consideration on the consequences and desirability of the earnings test is that its elimination may induce workers to retire "too early", not taking into account the lower benefits level (Gruber and Orszag, 2003). This could have damaging implications for poverty in old age. Gustman and Steinmeier (2004) point to the fact that the elimination of the earnings test could affect the short-term viability of the Social Security Trust Fund. Mastrobuoni (2006) evaluates the elimination positively affected the long-term finances of the Trust Fund.

disincentives really are, and whether they are consistent with observed behavioral responses found in the literature. Second, we look at the effect of the repeal of the earnings test on expectations of workers not yet directly affected by the test in 2000. We consider the subjective probabilities to work full-time past ages 62 and 65, as well as the age at which workers expect to start collecting Social Security benefits. We also look at the extent to which workers later deviate from these expectations because of the repeal of the earnings test. The identification strategy makes use of the pre-repeal tax rates calculated in the first step to form groups affected differently by the repeal. We study whether the changes in expectations around the time of the repeal vary across these groups.

Section 2 discusses the functioning of the earnings test and how it affects behavior according to theory. Section 3 presents the data and evidence on the disincentives due to the earnings test. In section 4, we analyze the effect of eliminating the earnings test on expectations. In section 5 we look at deviations of actual outcomes from expectations. Section 6 concludes.

## 2. The Earnings Test and Its Potential Effects on Labor Supply

The parameters determining the earnings tests before and after the normal retirement age (NRA) are given in Table 1. The earnings test that was abolished in 2000 concerns people above the NRA,[4] which was 65 years in 2000, but has been gradually increased since 2003. It was 65 years and 4 months for individuals turning 65 in 2004 and will be 65 years and 10 months for those reaching age 65 in 2007. The test applied until April 7 2000 to those who claimed benefits and had positive earnings.[5] Their OASI benefit was reduced by one dollar for every three dollars earned in excess of the exempt amount, which was $ 14,500 in 1998.[6] It is important to note that workers got

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[4] Social Security refers to the Normal Retirement Age as the Full Retirement Age (FRA).

[5] On April 7th 2000, President Clinton signed the "Senior Citizen Freedom to Work Act". Congress approved a preliminary version proposed on March 1st and the Senate approved the amended version on March 22nd. The desirability of the reform had already been emphasized in his 1999 State of the Union Address: "we should eliminate the limits on what seniors on Social Security can earn.". The vote was unanimous in the Senate in favor of the repeal. On March 23rd, the passing of the measure in the Senate surfaced in popular media (New York Times, March 23rd 2000). There was some discussion in the regular press about the upcoming reform. On February 20th, the New York Times reports that the president already signaled his attention to sign the bill if passed which shows that there was little uncertainty about the possibility that the law would be in effect before the end of the year. The repeal was in effect for earnings after December 31st 1999.

[6] In the year a worker reaches the normal retirement age, there is a special exemption for earnings in that calendar year. This exemption was $17,000 in 2000. See §1803.2 of the Social Security Handbook.

compensated for not receiving OASI benefits in a given year by receiving more in the future. This is illustrated in the final row of Table 1 (DRC: delayed retirement credit). The compensation for postponing claiming in the years after NRA has increased over time. For those born prior to 1926, DRC was 3.5%. It was 7.0% in 2004 and will eventually reach 8% for future cohorts reaching NRA.

An earnings test still applies for OASI benefits received before NRA (see Table 1). If someone claims OASI benefits before reaching NRA, the OASI benefit is reduced by one US dollar of every two dollars earned above an exempt amount. The exempt amount grew from $7,440 per year in 1992 (the year of the first wave of HRS) up to $11,640 in 2004 in nominal terms. If individuals[7] postpone claiming for another year and have not yet reached the NRA, they get 6.8 percent (ARF, the actuarial reduction factor) higher benefits every year in the future than they would get if they started claiming immediately. On average this appears to be a close to actuarially fair growth rate of future old age benefits.[8]

*A Two-Period Model*

In a static model of labor supply, agents only look at the current period, and the actuarial compensation for reduced benefits in later years (the DRC) is ignored. Hence, the earnings test is akin to a means-tested benefit. In a dynamic framework, optimizing individuals will take the DRC into account when making their labor supply decisions, under the condition that they are aware of it. Whether the latter is indeed the case is not so clear. Friedberg (2000) argues that actual labor supply behavior reveals that individuals are not aware of the DRC. Gruber and Orszag (2003) show that in one of the leading tax guides, no mention of the DRC is made.

To understand the labor supply effects of the earnings test in a dynamic framework, we construct a simple two-period model along the lines of Disney and Smith

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[7] For couples, the situation is often more complicated, due to spouse benefits. For those collecting spouse benefits, the earnings test is applied on their spouse's earnings. We ignore this issue in the current paper.

[8] For earnings lost before the NRA, the actuarial adjustment starts at the NRA. Each full monthly check lost gives rise to a one month actuarial adjustment. Hence someone who claims at age 62 and loses all his checks in that year because of high earnings, will receive the same check as someone who claimed at age 63 from the point where they reach the NRA onwards. Before the NRA however, the one who claimed early (and lost his first year benefit), will get checks from age 63 to the NRA that do not include the actuarial adjustment.

(2001). The static model and the model in which people are not aware of the delayed retirement credit will be captured as special cases.

For simplicity, assume individuals make decisions over two periods. In period 1, they can decide to claim OASI benefits or not, and can also choose hours of work $h$. In period 2, individuals claim (irrespective of whether claiming in period 1 or not) and do not work. The hourly wage rate in the first period is denoted by $w$. If claiming already in period 1, the individual gets pension $P_1$ in period 1 and $P_2^c$ in period 2. Let $P_2^n = P_2^c + \delta P_1$ be the benefit if the individual delays claiming to period 2. The actuarial adjustment factor is $\delta \geq 0$. Individuals discount period 2 income at a rate $\theta \geq 0$ (which incorporates mortality risk). Hence, the adjustment is perceived as unfavorable if $\delta < 1/\theta$, in which case income $P_1$ in the first period is preferred to $\delta P_1$ in the second period. The case of a myopic individual is represented by $\theta = 0$.

If the individual does not claim in the first period, the total discounted value of income is[9]

$$Y = wh + \theta P_2^n \tag{1}$$

If the individual decides to claim and work in the first period, income can be affected by the earnings test. The earnings test rule is defined by two parameters: the exempt amount $E$ (the maximum earnings allowed without being taxed) $E$ (the exempt amount) and the "tax rate" $\tau$ (the rate at which benefits are taxed away by the earnings test for each dollar above $E$). Three situations can occur depending on how many hours the individual decides to work. If $h < E/w$, the earnings test does not reduce benefits, and the present value of total income is

$$Y = wh + P_1 + \theta P_2^c \tag{2}$$

If hours are above the threshold (or, in other words, earnings are above $E$), benefits are reduced. The reduction is $e = \tau(wh - E)$ up to complete exhaustion of the benefit $P_1$. Exhaustion will occur when $e = P_0$, i.e., when hours worked are given by:

$$h_{\max} = (P_1/\tau + E)/w.$$

If the benefit is completely lost, the individual gets $P_2^n = P_2^c + \delta P_1$ in the second period, the same as if he would not have claimed. Define $\pi = e/P_1$, the fraction of the benefit lost in period 1. If benefits are partly taxed away, the benefit in the second period

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[9] We abstract from other taxes such as federal and state income taxes.

is $P_2^c + \pi \delta P_1$. SSA calculates the partial adjustments based on the number of months checks were not collected. On the segment $h \geq E / w$ and $h < h_{max}$, the present value of total income over the two periods is thus given by

$$Y = wh + (P_2^c - \tau(wh - E)) + \theta(P_2^c + \pi \delta P_1) \qquad (3)$$

Finally, an individual who works more than $h_{max}$ gets

$$Y = wh + \theta P_2^n. \qquad (4)$$

Note that (1) and (4) are equivalent in the case where working hours are so high that all benefits are exhausted. This would not be true if there was no actuarial adjustment under the earnings test. In that case, we would essentially have $\pi = 0$ instead of $\pi = e / P_1$. This will also be the relevant case for individuals who realize that they get a compensation for postponing claiming ($\delta > 0$) but do not realize that they are compensated in the same way if they have started to claim but their benefits are partially or completely taxed away by the earnings test; such individuals will base their decisions on the perception that $\pi$ equals zero.

For individuals who do not intend to work in period 1 or want to work few hours such that their earnings are below $E,$ it may still be profitable to delay claiming rather than to claim immediately. This is the case if the actuarial adjustment $\delta P_1$ is large enough to compensate for the lost benefits $P_1$. In this two period model, the condition for this is $\delta > 1/\theta$, i.e., the individual perceives the compensation for delayed claiming as more than fair.

To illustrate how expected income is affected by the earnings test, we consider the example in Figure 1, based upon the parameter values

$$w = 20, \ E = 14,500, \ \delta = 0.75, \tau = 0.33, \ \theta = 0.97, \ P_1 = P_2^c = 10,000$$

Since in this example $\delta < 1/\theta$, the individual considers the DRC as actuarially less than fair and will not postpone claiming if the earnings test does not apply. We consider two situations with claiming in period 1. One is the actual situation where adjustment due to the earnings test is possible ($\pi > 0$) and the other one is the situation where the individual is unaware of the adjustment in case the earnings test applies (and uses $\pi = 0$ in making his decisions).

Figure 1 presents this individual's "budget set", i.e., the present value of perceived total income as a function of hours of leisure (3000-hours of work) in period 1.

If the individual does not claim in period 1 (dashed line), the budget set is linear (progressive federal taxes are ignored in this stylized model). In the other two cases, the budget set is piecewise linear, with kinks at $h_{min} = E/w$ (= 725, i.e., 2275 hours of leisure) and $h_{max} = h_{min} + P_1/(\tau w) = 2225$ (775 hours of leisure). The slopes of the flatter part in the middle, however, are quite different. If $\pi = 0$, the slope is $(1-\tau)w(=13.33)$, since the individual perceives no compensation for the benefits that are taxed away. In this case, the individual may easily think that it is better not to claim. In the actual situation on the other hand, where $\pi = e/P_1$, the slope is higher ($13.33 + \theta\delta\tau w = 18.18$), because of the actuarial adjustment. The difference with the slope of $w$ (=20) is due to the fact that the individual's subjective discount rate makes the actuarial adjustment unfair, so that the delayed receipt of benefits is still seen as a mild tax on earnings.

Abolishing the earnings test can have different effects on labor supply period 1, depending on where the individual would be on the budget curve in the presence of the earnings test and depending on whether or not he claims in the first period.

First consider someone who is claiming benefits in the presence of the earnings test, and works more than $h_{max}$ hours (group A). Abolishing the earnings test does not change the marginal wage rate but has a negative income effect. Hence, the repeal is expected to reduce the work effort.

Next consider the group claiming benefits and working between $h_{min} = E/w$ and $h_{max}$ in the presence of the earnings test (group B). This group has some benefits taxed away by the earnings test and face both a substitution and an income effect from the repeal. With no earnings test, the worker gets higher income, reducing hours worked (income effect) but also a higher marginal reward from additional working hours, leading to an increase in labor supply (substitution effect). The total effect is ambiguous.

Individuals just above or exactly at the kink $h_{min}$ will want to work if the earnings test is eliminated, since for them, there is hardly any income effect. The income effect will be larger if the individual is closer to $h_{max}$. We thus expect a positive effect on labor supply for those close to or at $h_{min}$, and a smaller positive or even negative effect for those close to $h_{max}$. In our empirical work, we will exploit information from SSA earnings

records to determine where individuals are before the earnings test is repealed and how close the respondents actually are to the two kinks.

For the group who claim benefits in period 1 and work less than $h_{\min}$ (group C), the earnings test is irrelevant – their earnings are so low that the earnings test does not reduce their benefits. Their behavior will not change if the earnings test is abolished.[10]

Finally, consider the respondents who do not claim benefits as long as the earnings test applies because they see the actuarial adjustment as favorable. For this group (group D), the repeal has no effect – they will also not claim if the earnings test is eliminated.

A second group of non-claimants are those who perceive the actuarial adjustment as unfavorable ($\delta < 1/\theta$) but misinterpret the rules of the earnings test and perceive $\pi = 0$ (group E). Their perceived budget set in case of claiming will changes with the repeal, and this may induce them to start claiming. In figure 1, these are the people on the dashed line who work more than (approximately) 1200 hours – for them, as long as the earnings test applies, the present value of total income is perceived as higher if they do not claim. This changes if the earnings test is abolished. They will then claim and reduce their working hours due to a negative income effect.

### 3. Data

We use all available cohorts of the Health and Retirement Study (HRS) in the waves 1992 - 2004. Table 2 presents the design of the HRS, illustrating when respondents were interviewed and how old they were at the time of the repeal. The original HRS cohort born 1931-1941 was first interviewed in 1992, the AHEAD cohort born before 1923 entered in 1993, the War Babies (born 1942-1947) and Child of Depression Age (CODA, born 1924-1930) entered in 1998, and the Early Boomers (EB, born 1948-1953) first participated in 2004, the last available wave. The cohort directly affected by the repeal is the original HRS cohort, for whom the normal retirement age was 65. When the earnings test was repealed in 2000, respondents of this cohort were between 59 and 69 years old. Their delayed retirement credit varies from 5.0% to 7.5%). Although the NRA of War Babies and some HRS respondents respondents is after the year of the repeal,

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[10] In practice, measurement error or rigidities may imply that respondents are observed below the kink but actually are at the kink. In that case, abolishing the earnings test will have a positive effect on their labor supply (as in group B).

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*expectations* of these younger workers can be affected by the repeal. They face a more favorable delayed retirement than their predecessors, however.


**3.1 Match with Social Security Earnings Records and Sample Selection**

In order to obtain exact information on OASI entitlements and how these are affected by earnings and claiming decisions, we link respondent records with their Social Security earnings history records. Thus we can accurately compute social security incentives faced by respondents and avoid measurement errors, which can be an important source of bias (see Haider and Loughran, 2005). We use administrative earnings records to compute benefit eligibility as well as the earnings profile. We have access to records for the HRS, War Babies and CODA cohorts.[11]

There are two potential drawbacks of using earnings record matched with HRS respondents. First, Social Security earnings are top-coded at the maximum taxable earnings (presently about $90,000). This applies to 6% of respondents in 1991 (HRS) and 1999 (for WarBabies and CODA). Respondents subject to the earnings test have lost their complete social security benefits before reaching the threshold of $90,000. Hence, the classification of respondents in terms of the incentive they face due to the earnings test is not affected by the censoring – all censored respondents are in group A.

Second, there is a fair number of respondents for whom a match to an SSA earnings record is not possible. In the HRS cohort, 75.1% of respondents have a successful match. For CODA and War Babies respondents, the match rates are much lower (50-60%). We will present some descriptive statistics for the two groups (those with and those without a match; see Table 4 below). This will show that in terms of observables the two samples do not differ much.

We use the Average National Wage Index constructed by the Social Security Administration to project earnings into the future. These earnings are needed to compute various measures of future retirement incentives. Over the period 1985-2003, the average growth rate was roughly 4%. Over the same period, inflation (measured by the Consumer

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[11] The HRS asked respondents in 1992, 1998, and 2004 for permission to match their earnings records. We do not have access to the earnings records data for 2004. Hence, we have no Social Security earnings data for the Early Boomers.

Price Index published by the Bureau of Labor Statistics) was on average 2.9% per year, thus yielding an about 1% real growth in earnings.[12]

For our analysis, we select an unbalanced sample of respondents aged 51 to 61 who report to be working for pay. We do this because the expectations questions we will examine are only asked to workers. In 1992, the entire original HRS cohort is age eligible, but this is not the case in later waves. Some respondents aged 51-61 have already retired, but this number is low compared to after age 61 when workers become eligible for Social Security benefits on their own earnings record. The first major refreshment of the original HRS sample is the War Babies cohort, aged 51-56 when entering in 1998.[13]

Table 3 gives the number of observations in each wave along with the number of observations for which we have Social Security Earnings Records (SS.Er). The sample generally gets smaller after 2000 until the new cohort of Early Boomers comes in. The fraction of respondents with an SS.Er is large in early years and decreases because of lower match rates for War Babies in 1998. The low match rate in 2004 reflects the fact that we do not have any SS.Er for the Early Boomers.

### 3.2 Descriptive Statistics

Table 4 presents descriptive statistics of some background variables that we shall use in the analysis of expectations in the age 51-61 sample. One potentially important job characteristic is the flexibility of the current job. If workers cannot change hours at their current employer, they need to change jobs to reduce hours (see, e.g., Hurd, 1996). This may be difficult, particularly for workers in their late 60s because demand for workers of this age may be lower and search costs may be higher. Some information on job flexibility is available in the HRS as of 1996. We use two questions, for which the response rate is quite high (above 90%). The first question refers to whether the respondent feels pressured by co-workers to retire before 65. This is used to measure the general attitude of co-workers (and often employers) to older workers. The other question refers to whether the respondent thinks that a transition to a low demanding job is

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[12] The assumptions made for the projections are that workers keep working their current hours, and that the growth rate of wages is the same across all groups of workers. Neither of these assumptions is completely correct. We do not forecast earnings at an individual level, since this leads to selection issues due to retirement incentives.

[13] The Early Boomers refresh the sample in 2004. For most of the analysis, we will not use the Early Boomers because we do not have their Social Security earnings records.

relatively easy at the current employer. This measures the flexibility to reduce work pressure, hours, or responsibilities in the current job. We code the answers as one (yes) if the respondent reports either "strongly agree" or "agree" and zero (no) otherwise. Over all waves, approximately one tenth of workers aged 51-61 think they are pressured to retire before 65 at their current employer. More than one quarter think that a transition to a low demanding job with the same employer is possible.

Table 4 also includes measures of current earnings, accumulated financial wealth (liquid = savings, stocks, bonds, CDs, IRAs) and non-financial assets such as real estate, and whether the respondent has an occupational pension on the current job and, if so, of what type - defined benefit or defined contribution. AIME is Average Indexed Monthly Earnings, a measure of life-time earnings, computed using the SS.Er earnings records. It is the monthly equivalent of the average earnings over the 35 years of highest admissible Social Security earnings. It is the basis for the primary insurance amount (PIA), the benefit to which a worker is entitled at the normal retirement age.[14] The median worker aged 51-61 had an AIME of $1578 in 1994, compared to $2237 in 2002.[15]

Differences in characteristics between the overall sample and the sample with matched SS.Er earnings records appear to be small, except for 2004 where the entire Early Boomers cohort does not have a match. Apart from this difference, some under representation of blacks is found, as well some difference in total financial wealth.

We focus on three measures of expectations. The first one is the subjective probability to work full-time in any period past age 65. This measure is relatively well documented, see, e.g., Hurd (1999) and Chan and Stevens (2004).[16] We refer to this question as P(65). The question is only asked when the respondent provided a positive probability to another probability question, asking the probability of working full-time past age 62. If the answer to this question (P(62)) is zero, P(65) is assigned a value of zero as well. Respondents are not asked P(62) and P(65) if they are 62 or older.[17] We will focus on the effect of the repeal of the earnings test after NRA on P(65), but will also consider its potential effects on P(62), since it may be the case that respondents who

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[14] The PIA is a piece-wise linear function of the AIME with two kink points and marginal tax rates of 0.9, 0.4 and 0.1 on the three segments.

[15] These amounts are not adjusted for inflation (using the CPI $1578 in 1994 dollars is $1916 in 2002 dollars).

[16] The exact wording of the question is "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 65". The answer is a number between 0 and 100 (in 1992 between 0 and 10 which is recoded).

[17] There are some exceptions due to routing inconsistencies.

change their mind about working at age 65 are more likely to keep working between age 62 and age 65, due to the costs of labor force exit and entry.

The third expectations question we consider is the expected age at which respondents expect to claim Social Security benefits. We will denote this variable as EC. Values are missing for respondents who reported they did not anticipate receiving any Social Security benefits. There is a fair amount of don't knows as well. Overall, the value is missing for 19-24% of the respondents in our sample (varying across waves). Note that EC is just a point estimate, if respondents are uncertain it may be the most likely age at which they think they can start claiming, or the median or mean of their subjective distribution. Thus the information in this point estimate is more ambiguous than the information in the probability questions P(62) and P(65) (cf. Manski, 2004). Furthermore, rounded ages of claiming probably eliminate some of the important variation to the earnings test, particularly if the response is small (say a couple of months).

Table 5 shows the evolution of P(65) and EC over time. Answers to P(65) and EC show an upward trend over time in this sample. Of course, we do not know if this is a true time effect because the composition of the sample changes over waves. This is a consequence of the age restriction - only respondents younger than 62. This age restriction is needed for P(62) and P(65) because these questions are not asked after that, and is also used for the expected claiming age to avoid dealing with the sample selection problem introduced by those who start claiming from age 62.

### 3.3. Incentive Measures from the Earnings Test

For respondents with a match, we calculate social security benefits and potential loss due to the earnings test. From these we can calculate various measures of social security wealth that involve the effect of the earnings test at the early retirement age (62) and the normal retirement age (65 or 66). We consider three such measures:

**Myopic loss:** In a year in which the earnings test applies, the loss is given by

$$e_k = \max(\min(\tau_k[wh - E_k], P_1), 0), \quad k = ERA, NRA \quad \textbf{(5)}$$

It is the loss in benefit that the worker incurs at age $k$ if he earns $wh$ at age $k$.[18]

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[18] We calculate the gross loss due to the earnings test ignoring taxation issues, which will give an upper bound of the loss after tax. Progressivity in Taxation can also have a labor supply effect because the

**Forward-Looking Loss according to Life-Table Survival Probabilities:** This measure is the sum of the myopic loss and the gain arising from the actuarial adjustment (DRC) compared to a situation where there is no earnings test:

$$f_{L,k} = e_k - \sum_{s=k}^{A} S_{L,k}(s)\theta^{s-k+1}(\pi_k \delta_k P_{k,s}) \tag{6}$$

where $S_{L,k}(s)$ represents the life-table probability of living to age $s$ given survival up to age $k$. The terminal age $A$ is set such that $S_{L,k}(A) \approx 0$ (here $A=109$). $P_{k,s}$ is the pension someone gets at age $s$ from claiming at age $k$.

**Forward-Looking Loss according to Subjective Survival Probabilities:** As discussed by Tran (2004), the actuarial adjustment may be fair for some but not for others who have lower life expectancy. This is particularly important in the case of the earnings test since individuals who are at the kink (the point where the earnings test kicks in), are likely to have lower socio-economic status and health than those higher in the earnings distribution. One reason why the earnings test might have an effect on those workers is that the actuarial adjustment is relatively unfair for them because of their low survival probabilities. We therefore also consider a forward-looking loss measure that takes account of the dispersion in survival probabilities in the population. Delavande and Rohwedder (2006) find that the heterogeneity in subjective probabilities proxies very closely the variation in true survival probabilities in the HRS/AHEAD panel. We therefore construct a set of average subjective probabilities $S_{j,k}(s)$ for groups of respondents characterized by health, education, gender and age (see Appendix A for details on the construction of such probabilities). The subjective loss is given by[19]

$$f_{j,k} = e_k - \sum_{s=k}^{A} S_{j,k}(s)\theta^{s-k+1}(\pi_k \delta_k P_k) . \tag{7}$$

For forward looking measures, we use a real discount rate of 3% (i.e., $\theta = 0.97$). We use a 2.9% inflation rate in our forecast and thus a nominal discount rate of 5.9%.

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marginal tax rate changes as a result of the elimination of the earnings test. However, the degree of progressivity in the U.S. tax system is not pronounced.
[19] Note that (6) and (7) are not exactly correct in the case where we evaluate the loss at the early retirement age. In that case, the actuarial adjustment only kicks in once the worker reaches the NRA. One way to incorporate that is to define $\pi_{ERA,s} = I(s \geq NRA)\pi_{ERA}$ so that the actuarial adjustment in the earnings test operates only after the NRA.

Social security benefits are based on projected AIME from ages 62 and 69. We use the formula in effect during the period covered by the data. Appendix B gives details on the construction of benefits. We do not take account of spouse benefits. The earnings test also applies to the spouse benefit but it depends on both spouses earnings. This omission is likely more important for females than males.

We first describe patterns of expected social security wealth assuming workers retire when they claim Social Security benefits. This helps understand the heterogeneity in the actuarial adjustment which workers face when they consider claiming benefits. We compute Social Security wealth as

$$
\begin{aligned}
W_{L,k} &= \sum_{s=k}^{A} S_{L,k}(s)\theta^{s-k}P_{k,s} \\
W_{j,k} &= \sum_{s=k}^{A} S_{j,k}(s)\theta^{s-k}P_{k,s} \\
k &= 62,...,69
\end{aligned}
\tag{13}
$$

Here $P_{k,s}$ is the annual projected social security benefit at age $s$ if the respondent starts claiming at age $k$. In addition, we compute an "accrual" rate defined as

$$
A_{L,k} = \frac{W_{L,k+1} - W_{L,k}}{W_{L,k}}, k = 62,..,68
\tag{14}
$$

Similarly, we compute accrual rates $A_{j,k}$ using subjective mortality rates instead of life tables. Because workers differ in terms of their potential benefits, earnings history, birth cohort (determining many benefit rule parameters), and life expectancy (in the subjective case), there is considerable variation in the accruals.

Table 6 presents Expected Social security wealth at age 62, the early retirement age, for the 10th, 25th, 50th (Median), 75th and 90th quantile of workers aged 51-61 and the ratios of other quantiles to the median. It also presents the distribution of accruals defined in equation (14). It uses both life-table and subjective probabilities.

Using life-table probabilities, median expected social security wealth at age 62 is $148,000. There is considerable variance, with the 10th quantile expecting $58,000 and the 90th quantile expecting $228,000. The variance is still larger when subjective survival rates are used. The median using subjective survival probabilities is slightly lower ($147,000), reflecting pessimism in the subjective survival probabilities, on average.

Social Security accruals are generally positive at the median until age 65 where for some workers, the DRC may not be sufficient to compensate for increased mortality risk. There is also considerable heterogeneity in accruals. At age 65, half of the sample

has negative and the other half has positive accruals. Accruals tend to be lower using subjective probabilities because these imply higher mortality risk than the life tables.

Table 7 presents the loss (or gain) due to the earnings test using the myopic loss $e_k$ and the forward-looking measures using life-table survival probabilities $f_{L,k}$ and subjective survival probabilities $f_{j,k}$. These losses are reported in dollars, as a fraction of earnings, and as a fraction of liquid financial assets (as a measure of liquidity constraints). The myopic loss is larger at age 62 than at the NRA, due to a higher exempt amount and a lower marginal tax rate at the NRA. The heterogeneity in myopic tax rates is largely due to differences in projected earnings and benefit entitlements.

Because of actuarial adjustments, the forward looking tax is much lower than the myopic rate. Of course, if the actuarial adjustment was completely fair, the tax would be zero. Whether it is perceived as fair depends on the "true" discount rates that individuals use. Additional heterogeneity is introduced when computing these forward-looking taxes, e.g. since they vary by birth cohort (due to different actuarial adjustment). The subjective forward-looking tax measure is somewhat higher for females than for males, since females underpredict their probability to live up to age 75.

Since one interpretation why workers might prefer to claim and be subject to the earnings test is that they are liquidity constrained, we express the taxes also as a fraction of *current* liquid wealth. This shows that for a substantial fraction of workers (with low financial wealth), the tax represents a large fraction of their liquid wealth.

The mean forward looking tax rate (as fraction of earnings) is very close to zero for younger workers. About 90% of workers in the age 51-61 sample face a tax lower than $5000 on life-time Social Security wealth. Expressed as a fraction of earnings or financial wealth, the tax imposed by the earnings test is therefore not large. Hence, if workers perceive the rules correctly, we should not expect large labor supply effects of the repeal. This is particularly true for later cohorts, for whom the rate of actuarial adjustment is larger.

## 5. The Effect of the Repeal on Expectations and Deviations from Expectations

### 5.1 The Effect on Expectations

As explained in Section 2, workers with different expected loss due to the earnings test are predicted to react differently to the repeal. This is the case if workers are not aware of the actuarial adjustment compensating for benefits lost due to the earnings test, or, to a lesser extent, to workers who perceive the actuarial adjustment as actuarially unfair. This suggests that we can use a difference-in-difference approach by grouping workers according to the pre-repeal incentives they faced as a consequence of the earnings test. The key to this identification strategy is the determination of the groups that get different treatments. We define the groups based on the percentage of social security benefits predicted to be lost at the normal retirement age (NRA).

For example, those who were not expected to be affected by the repeal, i.e. had no loss due to the earnings test, are not likely to react to its repeal. This concerns everyone with earnings below the exempt amount. On the other hand, those who earn exactly the exempt amount or somewhat more should react to the repeal - it will increase the marginal return to working more hours, and we therefore expect them to get a higher probability to work full-time past age 65. For the group who earn substantially more than the exempt for whom a high share of their benefit but not everything is taxed away, the same substitution effect applies, but this is more likely to be compensated by an income effect: eliminating the earnings test will not only change their marginal wage but also bring them to a higher indifference curve. This effect will become larger the higher the amount of benefit which was lost under the earnings test. Hence, for the group that has a substantial fraction taxed away, the total effect is unknown. Finally, for the group for whom all benefits are taxed away under the earnings test, there will be no substitution effect but only a (probably negative) income effect, and one would expect a negative effect of eliminating the earnings test on the probability to work past 65.

We thus define groups in the following way:

1. No benefit lost: Projected earnings below 80% of the exempt amount,
2. 1% to 49% of benefit lost
3. 50% to 99% of benefit lost
4. 100% of benefit lost

Denote by $g_c, c = 1, 2, 3, 4$, the indicators that take value 1 when the respondent is in one of these four groups. We use 1998 as the year to define the grouping since it is the wave

preceding the repeal. Define a variable $REP_t$ that takes value 1 for observations after the repeal in 2000. Since job characteristics are only observed from 1996 onwards, and we cannot use the cohort of "Early boomers" in 2004, and we are left with the time widow 1996-2002.

We first consider the respondents who report a non-missing expectation in waves 1998 and 2002. The idea is to look for a differential change between the two waves across groups. Composition effects cannot occur because we consider the same respondents in both waves. The identifying assumption is that all groups would have similar trends in expectations if there were no repeal. Table 8 reports mean expectations in both waves for each group, separately for males (left hand panel) and females (right hand panel).

For males, the results for P(65), the probability to work full-time at any point in time after reaching age 65, are in line with what the theory discussed above predicts. Respondents for whom the earnings test was not binding (group 1) hardly change their average P(65), and the fraction with nonzero P(65) does not change much either. This suggests that there is not much of a trend in P(65). For group 2, the group for which we predicted the largest positive effect, we indeed find a substantial increase in the average value of the probability to work full-time after the normal retirement age of 65 years, and we also find a substantial increase in the fraction reporting that this probability is nonzero after the repeal. Taking group 1 as the control group (the group with no treatment), the difference in differences estimators are 2.98%-points for the increase in the average P(65) and 7.75%-points for the increase in the percentage of male workers with nonzero P(65). For group 3, we find positive but smaller effects, in line with theory – here the positive substitution effect is partly cancelled by a negative income effect. Finally, for group 4, we do not find much of an effect. We would have expected to find a negative income effect here, but their change in P(65) is actually somewhat larger than that for the control group instead of smaller. For these workers, Social Security benefits may actually represent a small share of their total wealth.

For female workers, the effects are quite different. All groups have positive changes, including the control group, suggesting a positive trend in the probability to work full-time past age 65 for these cohorts. The three groups that are affected by the earnings test (and its elimination) all show larger positive effects than the control group, implying that elimination of the earnings test will have a positive effect on labor supply.

In contrast to the theoretical prediction and the results for men, however, the effect is small for group 2 and larger for groups 3 and 4.

In the bottom panel of Table 8, we consider the expected age at which respondents think they will start claiming old age social security benefits. If people would think they are heavily taxed by the earnings test (ignoring or downgrading the compensation in the form of actuarial adjustment), but would realize that claiming later leads to higher benefits, we would expect that abolishing the earnings test has positive effects on the probability to claim at (or before) the normal retirement age. These effects should be largest for the people who are taxed most, i.e., for groups 3 and 4. On the other hand, if labor supply increases due to elimination of the earnings test, people will be less in need of immediate benefits and will tend to postpone claiming. This gives a negative effect on the probability to claim at NRA, particularly for group 2 and to a lesser extent for group 3. The results show that for all groups the probability to postpone claiming till after NRA rises over time, but the change is largest for group 1, the group that is unaffected by the earnings test. Thus abolishing the earnings test seems to make people claim earlier, in line with the first effect discussed above – their earnings are no longer taxed away. The differences between the three groups, however, are not in line with the theoretical arguments, neither for men nor for women.

An alternative interpretation would be that many workers also do not understand the negative consequences of early claiming for their future benefits level. Many workers will simply anticipate that they will start claiming when they stop working. Again, however, this is not in line with the results – we would then expect the largest positive effect on the probability to postpone claiming for group 2, the group with the largest positive effect on labor supply after NRA.

The difference in differences estimator only consider the balanced sample of individuals who work and answer the expectations questions both in 1998 and 2002. In order to exploit the complete unbalanced sample, we formulate a model that also controls for several background characteristics.

We observe for each individual $i$ in wave $t = 1,...,T_i$, the subjective probability to work past age 65, $p_{it}$, and the age at which respondents expect to claim benefits $e_{it}$. We model $p_{it}$ with a two-limit tobit equation, accounting for the substantial number of zeros and 100 in the observed answers:

$$p_{it}^* = \alpha_0 + \alpha_1 g_{i1} + \alpha_2 g_{i2} + \alpha_3 g_{i3} + \lambda_t + x_{it}\delta + \sum_{c=1}^{3} \xi_c (REP_t \times g_{ic}) + u_{it}$$

$$p_{it} = \min[\max(0, p_{it}^*), 100]$$

$$i = 1, ..., N, t = 1, ..., T_i$$

We consider two specifications, one where the $u_{it}$ are assumed to be independent over time (pooled tobit) and one where the $u_{it}$ are equi-correlated, i.e., are the sum of an error term which is assumed to be independent over time, and an individual effect which remains the same over time.

We include dummies for three of the four groups to capture differences between groups that remain constant over time, and time dummies to capture the trend relevant for all groups. (These variables were also included in the model which implicitly was behind the difference in difference estimates presented in Table 8). We also incorporate a number of background characteristics, some constant over time (race and education), others time varying (health, job characteristics, pension entitlements, household wealth).

The left hand panels of Tables 9a and 9b report the estimates of the parameters of main interest, the interactions ($\xi_c$) which measure the differential effect of elimination of the earnings test for each of the four groups. The complete two-limit tobit results (and the details on which background variables are included) are presented in the appendix C.

There are some differences in size of coefficients between the two columns, but qualitative conclusions are largely similar. The findings for men are largely in line with the difference in differences estimates in Table 8. We find results in accordance with theory – the largest positive effects of eliminating the earnings test are found for those whose marginal wage increases, a positive substitution effect. Unlike in Table 8, however, there is no evidence that an income effect in the opposite direction would reduce the total change for those with a substantial income gain (group 3). The estimated effect for group 3 is actually somewhat larger than that for group 2, though not significantly so. Evidence of an income effect is also not apparent from group 4 – its reaction to the elimination is not significantly different from that of the control group.

For women, the sign and ordering of the effects are in line with theory, with group 2 having the largest positive (substitution) effect, a smaller positive effect for group 3,

and a negative (income) effect for group 4. None of these effects are statistically significant, however.

In column 3, we consider the binary event whether a worker reports a positive or a zero probability to work full-time after age 65. A random effects probit model is used, with a specification that is otherwise the same as the random effects tobit model in the second column. The results for men are more in line with the theory than those for the tobit models, in the sense that group 2 now is affected most by elimination of the earnings test. The effect for group 3 is positive also, but smaller and not significant. We also consider a fixed effect model using a conditional logit. In that case, we rely on comparisons of sequences of expectations with some transitions. The identification comes from the comparison within sequences with an equal number of waves with positive expectations. For men, the results are similar to the random effect results suggesting that unobserved heterogeneity is not important for our previous conclusion. For women, the random effect results are qualitatively similar to those for the tobit models. The effects have the sign and ranking predicted by theory, but none of them is significant. For females, the fixed effect results for group 1 one is close to significant and larger than that of other groups. This suggest that unobserved heterogeneity is perhaps more important for females although results remain insignificant.

We also considered P(62), the probability of working past age 62. We have estimated the same models for this as for P(65), but found that the repeal of the earnings test had a small and insignificant effect for all groups. See the Appendix for the results.[20] This is understandable – although there are reasons why there could be indirect labor supply effects of the earnings test on P(62), the effects are likely to be smaller than those on P(65) where within period is immediately affected. The fact that we do not find evidence of these effects could be seen as evidence against intertemporal substitution or life-cycle optimization, but it could also just mean that these indirect effects are too small to be significant in the available sample.

Columns 4 and 5 of Tables 9a and 9b present the estimates of the effect of elimination of the earnings test on the expected claiming age. Column 4 presents the results of a random effects ordered probit model, distinguishing three cases: claiming before NRA, claiming at NRA, or claiming after NRA. A positive coefficient indicates that the probability to claim before NRA falls while the probability to claim after NRA

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[20] The fixed effect results are not shown but have the same negative conclusion.

rises (the effect on claiming at NRA is ambiguous). In column 5, no distinction is made between claiming before or at the normal retirement age, and a random effects probit model is estimated. The right hand sides of the ordered probit and probit models are specified in the same way as in the models for P(65).

In line with the results in Table 8, the parameter estimates are small, and we do not find significant effects on the expected claiming age[21]. Only if the three groups that are affected by the earnings test are merged (top panel of the table), we find marginally significant effect for men and a significant effect in the ordered probit for women, but the signs of the effects are opposite in the ordered probit and the probit model.

## 5.2 Deviations from Expectations

In the previous section we found that the repeal of the earnings test after NRA has had an effect on the probability that male respondents will work after age 65, but we found no evidence on an effect on the expected claiming age. One possible explanation for the latter might be that respondents report their most likely retirement age and the effect of the repeal may not be large enough to change this, even though the repeal does have an effect on the probability distribution. In this sense, the expected claiming age is not so informative. In this section we look at the realized claiming age, which does not suffer from the same problem – it is a realization, not a forecast. We consider two indicators of actual claiming decisions: whether someone claims when reaching NRA (or earlier), and the difference between the age when someone starts claiming and the last available forecast (given at age 61 or earlier).

For the actual decisions when respondents start claiming Social Security benefits, we select the survey years 1998 and 2000 and look at respondents who reach NRA between these two waves, who have not yet claimed Social Security benefits in 1998, and who will eventually claim prior to age 70.[22]

Table 10 presents the results. The number of respondents who claim immediately after reaching NRA increases with the repeal of the earnings test. The increase is

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[21] Fixed effect results were qualitatively similar and are not reported.

[22] For those reaching the NRA in 2000, we observe whether they claim at age 69 or earlier in the 2004 wave. Hence, to avoid problems of right-censoring, we select the sample of those who will actually claim between 65 and 69 years old. We consider 2000 rather than the 2002 interview because of this censoring issue. In 1996, very few respondents have reached the NRA. Only the oldest of the original cohort (age 61 in 1992). This is why we start in 1998.

substantial for men (13.7%-points), and smaller for women (3.7%-points). On the other hand, as we saw earlier, the expected claiming age does not show the same reaction to the repeal. As a consequence, we find that the average difference between actual and expected claiming age has become negative in 2000, while it was almost zero in 1998, for both men and women.

The bottom panel distinguishes the same four groups as before, on the basis of how much their earnings are taxed while the earnings test is still in place. Men and women have been merged to increase sample size. Still, sample size is quite small and the results should be interpreted with some care – differences are not statistically significant at the usual levels. Still, the results suggest that particularly those who were most affected by the earnings test decide to claim earlier after the earnings test is repealed. The groups with tax rates higher than 50% are the groups for which the difference between actual and expected claiming age is less (i.e., less positive or more negative) in 2000 than in 1998. The increase in the fraction of people claiming immediately after NRA is largest for the group with the highest tax on their SS benefits under the earnings test (27%-points), and the differences are also positive but smaller for the other groups who are taxed.

While suffering from small sample size, all these results thus point in the same direction: the repeal of the earnings has induced a change in actual claiming behavior that is in line with economic theory – more people claim immediately upon reaching NRA, because their benefits are no longer taxed by the earnings test. This leaves us with the question why we do not find an effect on expected claiming age, while the results for P(65) suggest that (male) respondents do adjust their expected labor supply behavior. A possible answer is that the expected claiming age provides incomplete information on the respondents' subjective probability distribution. It may well reflect the most likely outcome only, and probabilities may change without changing this most likely outcome. Another possibility is that the rounding to the nearest age in the question eliminates much of the variation that could be otherwise noted. By collecting better data on such expectations we could say more on how such expectations react to the change in incentives.

## 6. Conclusions

The elimination of the earnings test on social security benefits after the normal retirement age has been used as a natural experiment in various studies on actual labor

supply at an older age. In this study, we have focused on how this policy changes affects expectations of workers who have not yet reached an age at which they can claim old age social security benefits. We have presented a two period theoretical model, demonstrating that workers should react in different ways, depending on where they are on their budget set while the earnings test is still in place. This model also implies that the effects are smaller if workers realize that taxed away benefits will be returned in later years with actuarial adjustment. In that case, depending on the individual's discount factor and the actuarial adjustment rate, it may even be the case that the earnings test is irrelevant.

The advantage of looking at expectations is that we can see how expectations of the same people develop over time. Moreover, since some groups were not affected by the earnings test in the first place, a control group is available Administrative social security records linked to the core HRS data allow us to distinguish the control group and several treatment groups in our data. Combining this with the time dimension allows for a difference in differences approach. We applied this both to the self-reported probability of working full-time after age 65 (the normal retirement age during the time period we consider), and to the self-reported expected claiming age.

For men, we find substantial effects of elimination of the earnings test that on the probability to work after the normal retirement age, and the qualitative effects are in line with the theoretical predictions under the assumption that people do not realize that benefits taxed away by the earnings test are returned later with actuarial adjustment, or under the assumption that people have large discount rates or face liquidity constraints so that they hardly account for the future consequences of their current decisions. For women, no clear effects of elimination of the earnings test are found, probably due to the relation between the effect of the earnings test on own benefits and changes in spousal benefits, relevant to a large fraction of women in the sample. The issue of spouse benefits is not dealt with in the current paper and is an issue of further research.

Neither for men, nor for women, significant effects on the expected claiming age are found. This is puzzling, since theoretical arguments would predict that effects on labor supply and retirement would be accompanied by changes in the expected claiming age. It casts some doubt on whether people choose their (expected) claiming age based on the economic trade-off between leisure and income. This is also an issue for further research.

The conclusion that people adjust their future work and retirement plans to the rules of the social security system is important for public policy. It also implies that people realize that the rules change, giving them at least a chance to reconsider their retirement savings and investment portfolio. On the other hand, the result that the adjustment of plans is largely based on misperception of the rules, ignoring the actuarial adjusted compensation in later years for benefits lost under the earnings test, is also relevant. It confirms that many people do not always base their expectations and decisions on fully rational economic optimization and suggests that providing information and keeping the rules simple and transparent is as important in formulating policy measures as incorporating the desired financial incentives.

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## Appendix A: Calculation of Survival Probabilities

### *Using life tables*

To operationalize our adjustment of life-table survival probabilities, we start from a simple exponential hazard model widely used to approximate survival curves, the Gompertz hazard. We assume that life table mortality rates follow the specification $m_L(a) = \kappa_{0,L} \exp(\kappa_{1,L} a)$, where $a$ is age and the parameters $\kappa_{0,L}$ and $\kappa_{1,L}$ control the level and the slope of the log mortality rate. Using $S_L(a) = \exp(-\int_0^a m_L(s) ds)$, the probability to survive until at least age $a$ is given by

$$S_L(a) = \exp[\tfrac{\kappa_{0,L}}{\kappa_{1,L}} (1 - \exp(\kappa_{1,L} a))].  \tag{8}$$

Conditional on surviving up to age $a$, an individual has a probability to survive up to age $s$ ( $s > a$ ) given by $S_{L,a}(s) = S_L(s) / S_L(a)$.

### *Using subjective probabilities*

The HRS asks age eligible respondents to report the probability they will survive up to age 75. Answers to such questions are known to include considerable measurement error, as well as focal responses (at 0, 50 and 100). Hence, estimation of individual survival curves is difficult (see Gan, Hurd and McFadden, 2003). We therefore prefer to estimate group level subjective survival curves. We define groups by age (2 year age categories), education level (less than 12 yrs, 12 yrs, more than 12 yrs) and health status (excellent /very good/good or fair/poor). We pool all waves (ignoring calendar time effects) and calculate the mean of the subjective probability responses within each age-education-health cell. Hence, a respondent's cell and reference subjective life-table can change over waves if the respondent changes group, e.g. due to deterioration of health or simply due to aging.

In terms of the Gompertz model, the answers to the subjective probability question from age $a$ to age 75 represent a point on the conditional subjective survival curve of group $j$,

$$S_{j,a}(75) = \frac{\exp[\tfrac{\kappa_{0,j}}{\kappa_{1,j}} (1 - \exp(\kappa_{1,j} 75))]}{\exp[\tfrac{\kappa_{0,j}}{\kappa_{1,j}} (1 - \exp(\kappa_{1,j} a))]}.  \tag{9}$$

We impose that the baseline hazard across all groups is the same as the baseline hazard of the life-table ($\kappa_{1,j} = \kappa_{1,L}$). This means we estimate the proportional change in the mortality hazard across groups but not the baseline hazard. The shape could be estimated using the probability question to age 85 or using the fact that the conditional survival curve is observed at different ages (from age 51 to 61). However, an analytical solution is difficult to obtain for the two parameters simultaneously.

We can estimate $\kappa_{0,L}, \kappa_{1,L}$ from the life table mortality rates. We do this separately for men and women and for each year in the survey, using the yearly life-tables available at [www.mortality.org](www.mortality.org) (based on Vital Statistics). We regress $\log(m_L(a)) = \log(\kappa_{0,L}) + \kappa_{1,L}a + u$ where $u$ is an error term. Define the log ratio of the conditional survival probabilities to age $s$ from age $a$ as

$$r_{j,a}(s) = \log[\frac{S_{j,a}(s)}{S_{L,a}(s)}] = (D_L(s) - D_L(a))[\kappa_{0,j} - \kappa_{0,L}], \tag{10}$$

where

$$D_L(x) = \exp(\tfrac{1}{\kappa_{1,L}}(1 - \exp(\kappa_{1,L}x))). \tag{11}$$

This last term is "known" from estimation of the life-table parameters of the mortality hazard.

The proportional constant for group $j$ is then given by

$$\kappa_{0,j} = \frac{r_{j,a}(s)}{d_L(s) - d_L(a)} + \kappa_{0,L}, \tag{12}$$

where $d_L(x) = \log(D_L(x))$.

The conditional subjective survival at each age for group $j$ can be calculated from (9). These "corrections" adjust only for differences in the level of the log mortality hazard. Since this is probably the predominant difference in the underlying true hazard, this is likely to capture a considerable amount of differential mortality across groups.

Table A.1 reports the distribution of survival probabilities for 55 year old male and female respondents in 1992. The table shows that there is serious underprediction of survival probabilities to age 75, particularly for females (cf. Hurd and McGarry, 1995). For males, underprediction is rather small (3%), compared to 12% for females.

**Table A.1 Survival Probabilities based on Life-Tables and Subjective Probabilities Conditional on Surviving to Age 55**

| age | conditional survival | | Std. | Min | Max |
| | life-table | subjective | | | |
|---|---|---|---|---|---|
| Males | | | | | |
| 55 | 1 | 1 | 0 | 1 | 1 |
| 56 | 0.991 | 0.987 | 0.005 | 0.978 | 0.991 |
| 57 | 0.980 | 0.974 | 0.009 | 0.954 | 0.981 |
| 58 | 0.969 | 0.960 | 0.014 | 0.930 | 0.971 |
| 59 | 0.957 | 0.945 | 0.019 | 0.904 | 0.960 |
| 60 | 0.944 | 0.929 | 0.024 | 0.878 | 0.948 |
| 65 | 0.862 | 0.838 | 0.052 | 0.729 | 0.879 |
| 75 | 0.610 | 0.590 | 0.102 | 0.381 | 0.675 |
| 85 | 0.271 | 0.299 | 0.102 | 0.101 | 0.393 |
| 95 | 0.037 | 0.082 | 0.044 | 0.007 | 0.130 |
| 105 | 0.001 | 0.007 | 0.005 | 0.000 | 0.014 |
| 109 | 0.000 | 0.001 | 0.001 | 0.000 | 0.003 |
| Females | | | | | |
| 55 | 1 | 1 | 0 | 1 | 1 |
| 56 | 0.995 | 0.990 | 0.003 | 0.982 | 0.993 |
| 57 | 0.989 | 0.979 | 0.007 | 0.964 | 0.985 |
| 58 | 0.982 | 0.967 | 0.011 | 0.944 | 0.977 |
| 59 | 0.975 | 0.955 | 0.015 | 0.923 | 0.968 |
| 60 | 0.967 | 0.942 | 0.019 | 0.901 | 0.958 |
| 65 | 0.918 | 0.863 | 0.042 | 0.774 | 0.900 |
| 75 | 0.751 | 0.633 | 0.091 | 0.444 | 0.717 |
| 85 | 0.457 | 0.334 | 0.102 | 0.134 | 0.438 |
| 95 | 0.111 | 0.092 | 0.048 | 0.010 | 0.151 |
| 105 | 0.003 | 0.007 | 0.005 | 0.000 | 0.015 |
| 109 | 0.000 | 0.001 | 0.001 | 0.000 | 0.003 |

Notes: Respondents aged 55 in 1992

**Appendix B: Calculation of Social Security Benefits**

We calculate the AIME of each respondent for each year in the survey as well as the projected AIME from ages 62 to 69. As for growth in future earnings, we use the growth in the Average National Wage Index. We take the last Social Security earnings in the SS.Er as the basis for computing each projection. This also assumes that the worker continues to work until the age at which we calculate the AIME. Hence, we adjust quarters of coverage accordingly so that an individual who is not eligible at age 55 but works until 62 could become eligible at age 62. In general workers are eligible if they accumulated more than 40 quarters of coverage (10 years where they accumulated 4 credits from covered earnings). To calculate benefits, we use a formula constructed from the Social Security Handbook. We have done limited benchmark against the Social Security ANYPIA formula. Many parameters of the benefit formula are adjusted every year by SSA to reflect general changes in prices and cost-of-living. For years beyond 2004, parameters of the formula such as bend points for computing the PIA, the exempt amount under the Earnings test, the maximum taxable earnings for Social Security are all updated using their average growth rate over the period 1985-2003. This is usually closely in line with the average national wage index. Hence, this implies that workers expect a change in those parameters which is consistent with previous recent changes to the benefit formula.

We take into account the minimum PIA in case the worker's PIA is too low. Upon calculating the PIA, the benefit is adjusted for early or late claiming using the Actuarial Reduction factor (ARF before NRA) and the Delayed Retirement Credit (DRC) that applies depending on the birth cohort. We implement the COLA adjustment which adjusts for inflation and cost-of-living increases. The average cost-of-living adjustment over the period 1985-2003 is used (2.9%). Finally, the earnings test is implemented using the rules in effect as outlined in Table 1.

# Appendix C: Complete Results Table 9 Males

| covariate | tobit P65 | RE tobit P65 | RE probit (P65>0) | Conditional Logit (P65>0) | Ordered Probit (EC: <NRA, NRA, >NRA)) | RE probit (EC>NRA) |
|---|---|---|---|---|---|---|
| widow | -7.776 | -7.046 | -0.373 | | 0.039 | 0.515 |
| (ref: married) | 0.283 | 0.173 | 0.190 | | 0.807 | 0.099 |
| divorced | -1.325 | 0.749 | 0.076 | | -0.013 | 0.026 |
| | 0.673 | 0.741 | 0.589 | | 0.856 | 0.872 |
| never married | 3.236 | 2.186 | 0.381 | | 0.034 | 0.124 |
| | 0.590 | 0.595 | 0.205 | | 0.792 | 0.677 |
| black | -13.204 | -10.960 | -0.646 | | -0.313 | -0.338 |
| | 0.000 | 0.000 | 0.000 | | 0.000 | 0.093 |
| other race | 6.348 | 3.513 | -0.156 | | 0.147 | 0.257 |
| | 0.216 | 0.377 | 0.538 | | 0.202 | 0.327 |
| years schooling | 2.018 | 1.187 | 0.069 | | 0.046 | 0.125 |
| | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 |
| health good | -8.429 | -5.450 | -0.189 | -0.076 | -0.090 | -0.096 |
| | 0.000 | 0.000 | 0.672 | | 0.052 | 0.354 |
| health fair/poor | -4.853 | -0.579 | -0.004 | -0.492 | 0.064 | -0.040 |
| | 0.240 | 0.844 | 0.984 | 0.101 | 0.550 | 0.859 |
| self-employed | 30.210 | 20.014 | 0.793 | 0.006 | 0.113 | 0.389 |
| | 0.000 | 0.000 | 0.000 | 0.988 | 0.065 | 0.004 |
| tenure current job | -0.265 | -0.240 | -0.014 | -0.036 | -0.003 | -0.009 |
| | 0.002 | 0.000 | 0.000 | 0.010 | 0.110 | 0.047 |
| pressure to retire | -5.316 | -4.501 | -0.255 | -0.369 | -0.195 | -0.037 |
| < 65 from co-workers | 0.070 | 0.024 | 0.014 | 0.114 | 0.004 | 0.810 |
| transition less | 5.463 | 2.041 | 0.105 | -0.005 | 0.035 | 0.183 |
| demanding job poss. | 0.012 | 0.152 | 0.180 | 0.976 | 0.465 | 0.080 |
| 1st quintile wealth | 17.377 | 13.610 | 0.394 | 0.561 | 0.266 | 0.366 |
| | 0.000 | 0.000 | 0.004 | 0.111 | 0.000 | 0.024 |
| 2nd quntile wealth | 6.348 | 5.738 | 0.083 | -0.020 | 0.058 | 0.082 |
| (ref: 3rd quintile) | 0.025 | 0.002 | 0.437 | 0.938 | 0.360 | 0.556 |
| 4th quntile wealth | -7.240 | -3.284 | -0.220 | -0.239 | -0.113 | -0.239 |
| | 0.009 | 0.075 | 0.033 | 0.335 | 0.064 | 0.080 |
| 5th quintile wealth | -16.386 | -9.125 | -0.521 | -0.681 | -0.104 | -0.208 |
| | 0.000 | 0.000 | 0.000 | 0.059 | 0.110 | 0.150 |
| has DB plan current | -14.619 | -7.068 | -0.170 | | -0.116 | -0.186 |
| job | 0.000 | 0.000 | 0.056 | | 0.021 | 0.100 |
| has DC plan current | 1.391 | 0.978 | 0.072 | | 0.127 | 0.195 |
| job | 0.502 | 0.481 | 0.360 | | 0.006 | 0.054 |
| total HH income | 1.145E-05 | 9.023E-06 | 1.862E-06 | 0.000 | 2.998E-07 | 1.663E-07 |
| | 0.015 | 0.003 | 0.000 | 0.063 | 0.008 | 0.412 |
| Social Security wealth | 3.657E-04 | 3.176E-04 | 1.034E-05 | | 8.626E-06 | 7.048E-06 |
| age 62 - subjective | 0.000 | 0.000 | 0.001 | | 0.000 | 0.059 |
| SS accrual age 62 | 0.760 | 0.641 | 0.072 | | -0.020 | 0.009 |
| (%) - subjective | 0.001 | 0.001 | 0.054 | | 0.339 | 0.574 |
| Current AIME | -0.013 | -0.011 | -3.713E-04 | | -2.895E-04 | -1.733E-04 |
| | 0.000 | 0.000 | 0.001 | | 0.000 | 0.171 |
| t=1998 | 3.959 | 2.181 | 0.104 | 0.036 | -0.034 | 0.206 |
| (ref: t=1996) | 0.099 | 0.133 | 0.172 | 0.862 | 0.516 | 0.066 |
| 1-50% of P | -6.776 | 0.059 | -0.097 | | -0.055 | -0.064 |
| Control is no tax | -4.705 | -4.057 | -0.105 | | -0.160 | -0.108 |
| 51-99% of P | 0.187 | 0.098 | 0.518 | | 0.054 | 0.559 |
| | -14.991 | -12.723 | -0.286 | | -0.262 | -0.486 |
| 100% if P | 0.001 | 0.000 | 0.164 | | 0.012 | 0.031 |
| | -9.426 | -7.732 | -0.408 | | -0.003 | 0.201 |
| repeal (REP=1) | 0.079 | 0.045 | 0.111 | -0.132 | 0.982 | 0.431 |
| Control is no tax | 1.963 | 1.253 | 0.114 | 0.773 | -0.161 | 0.383 |
| 1-50% of P X REP | 0.640 | 0.632 | 0.437 | 0.783 | 0.098 | 0.049 |
| | 9.927 | 5.944 | 0.448 | 0.023 | 0.047 | -0.090 |
| 51-99% of P X REP | 0.053 | 0.058 | 0.010 | 0.233 | 0.688 | 0.698 |
| | 10.388 | 7.505 | 0.229 | 0.475 | 0.113 | 0.217 |
| 100% of P X REP | 0.040 | 0.015 | 0.169 | 0.184 | 0.329 | 0.342 |
| | -4.431 | 3.033 | 0.018 | 0.744 | -0.059 | -0.375 |
| constant | -24.851 | -2.351 | -0.880 | | | -4.295 |
| | 0.004 | 0.697 | 0.015 | | | 0.000 |
| age dummies | yes | yes | yes | | yes | yes |
| N | 4146 | 4146 | 4146 | 1166 | 3791 | 3791 |
| rho (share UH) | | 0.590 | 0.666 | | | 0.462 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P65 is the subjective probability to work full-time past 65. EC represents the age at which the respondent expects to claim Social Security Benefits.

# Appendix C Complete Results Table 9 Females (Not Intended for Publication)

| covariate | tobit P65 | RE tobit P65 | RE probit (P65>0) | Conditional Logit (P65>0) | Ordered Probit (EC: <NRA, NRA, >NRA)) | RE probit (EC>NRA) |
|---|---|---|---|---|---|---|
| widow | 13.594 | 11.553 | 0.342 | | -0.058 | -0.357 |
| (ref: married) | 0.000 | 0.000 | 0.006 | | 0.442 | 0.072 |
| divorced | 19.702 | 15.184 | 0.541 | | 0.241 | 0.207 |
| | 0.000 | 0.000 | 0.000 | | 0.000 | 0.086 |
| never married | 9.570 | 8.803 | 0.331 | | 0.021 | -0.073 |
| | 0.060 | 0.029 | 0.129 | | 0.850 | 0.775 |
| black | -12.847 | -10.125 | -0.333 | | -0.251 | -0.387 |
| | 0.000 | 0.000 | 0.003 | | 0.000 | 0.014 |
| other race | -3.127 | -2.927 | -0.001 | | 0.239 | 0.114 |
| | 0.548 | 0.480 | 0.997 | | 0.030 | 0.664 |
| years schooling | 3.211 | 2.556 | 0.112 | | 0.054 | 0.111 |
| | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 |
| health good | -4.291 | -2.303 | -0.107 | -0.195 | -0.039 | 0.009 |
| | 0.029 | 0.107 | 0.106 | 0.218 | 0.372 | 0.920 |
| health fair/poor | -7.728 | -4.824 | -0.281 | -0.400 | 0.117 | -0.128 |
| | 0.017 | 0.047 | 0.014 | 0.101 | 0.122 | 0.456 |
| self-employed | 24.386 | 17.424 | 0.632 | 0.696 | 0.175 | 0.281 |
| | 0.000 | 0.000 | 0.000 | 0.125 | 0.006 | 0.036 |
| tenure current job | -0.496 | -0.414 | -0.016 | -0.031 | -0.004 | -0.006 |
| | 0.000 | 0.000 | 0.000 | 0.023 | 0.102 | 0.226 |
| pressure to retire | -6.134 | -1.982 | -0.044 | 0.254 | -0.182 | -0.236 |
| < 65 from co-workers | 0.042 | 0.364 | 0.644 | 0.187 | 0.008 | 0.139 |
| transition less | 5.961 | 3.515 | 0.095 | -0.057 | 0.184 | 0.337 |
| demanding job poss. | 0.003 | 0.014 | 0.148 | 0.690 | 0.000 | 0.000 |
| 1st quntile wealth | 12.048 | 8.666 | 0.241 | 0.123 | 0.186 | 0.192 |
| | 0.000 | 0.000 | 0.030 | 0.681 | 0.007 | 0.187 |
| 2nd quntile wealth | 7.182 | 3.564 | 0.119 | -0.093 | 0.071 | 0.012 |
| (ref: 3rd quintile) | 0.006 | 0.059 | 0.172 | 0.630 | 0.229 | 0.922 |
| 4th quntile wealth | -9.005 | -6.605 | -0.241 | -0.174 | -0.060 | -0.145 |
| | 0.001 | 0.000 | 0.005 | 0.408 | 0.307 | 0.229 |
| 5th quntile wealth | -16.844 | -11.380 | -0.334 | 0.278 | -0.130 | -0.186 |
| | 0.000 | 0.000 | 0.001 | 0.323 | 0.042 | 0.160 |
| has DB plan current | -11.278 | -6.832 | -0.207 | | -0.173 | -0.336 |
| job | 0.000 | 0.000 | 0.005 | | 0.000 | 0.001 |
| has DC plan current | 6.234 | 2.968 | 0.085 | | 0.056 | -0.009 |
| job | 0.002 | 0.037 | 0.202 | | 0.208 | 0.920 |
| total HH income | 1.29E-06 | -1.95E-06 | 3.62E-09 | 0.000 | 3.18E-07 | 2.34E-07 |
| | 0.837 | 0.657 | 0.987 | 0.984 | 0.009 | 0.162 |
| Social Security wealth | 1.46E-04 | 1.25E-04 | 3.45E-06 | | 8.69E-06 | 7.35E-06 |
| age 62 - subjective | 0.014 | 0.008 | 0.154 | | 0.000 | 0.018 |
| SS accrual age 62 | 0.226 | 0.167 | 0.004 | | 0.004 | 0.010 |
| (%) - subjective | 0.089 | 0.112 | 0.485 | | 0.210 | 0.148 |
| Current AIME | -0.006 | -0.005 | -1.54E-04 | | -3.56E-04 | -2.56E-04 |
| | 0.023 | 0.009 | 0.141 | | 0.000 | 0.041 |
| t=1998 | -0.379 | -0.810 | 0.118 | 0.015 | -0.153 | 0.017 |
| (ref: t=1996) | 0.868 | 0.586 | 0.059 | 0.925 | 0.002 | 0.865 |
| 1-50% of P | 1.154 | 0.478 | 0.114 | | -0.181 | -0.168 |
| Control is no tax | 0.706 | 0.836 | 0.338 | | 0.008 | 0.289 |
| 51-99% of P | 4.066 | 2.989 | 0.296 | | -0.077 | 0.154 |
| | 0.352 | 0.368 | 0.091 | | 0.421 | 0.472 |
| 100% if P | 6.894 | 6.197 | 0.579 | | -0.121 | 0.034 |
| | 0.380 | 0.280 | 0.071 | | 0.468 | 0.920 |
| repeal (REP=1) | 8.225 | 4.630 | 0.326 | 0.005 | -0.291 | 0.195 |
| Control is no tax | 0.007 | 0.026 | 0.000 | 0.987 | 0.000 | 0.171 |
| 1-50% of P X REP | 1.810 | 2.394 | 0.127 | 0.334 | 0.126 | 0.101 |
| | 0.644 | 0.360 | 0.264 | 0.127 | 0.167 | 0.571 |
| 51-99% of P X REP | 0.458 | 1.956 | 0.066 | 0.139 | 0.074 | -0.171 |
| | 0.925 | 0.550 | 0.647 | 0.604 | 0.496 | 0.388 |
| 100% of P X REP | -6.206 | -2.709 | -0.365 | -0.890 | -0.225 | -0.164 |
| | 0.617 | 0.736 | 0.339 | 0.247 | 0.396 | 0.702 |
| constant | -47.681 | -26.799 | -1.633 | | | -4.022 |
| | 0.000 | 0.000 | 0.000 | | | 0.000 |
| age dummies | yes | yes | yes | yes | yes | yes |
| N | 5306 | 5306 | 5306 | 1745 | 4363 | 4363 |
| rho (share UH) | | 0.447 | 0.632 | | | 0.439 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P65 is the subjective probability to work full-time past 65. EC represents the age at which the respondent expects to claim Social Security Benefits.

# Appendix C (Continuted) Results P62 (Not Intented for Publication)

| Males | tobit P62 | RE tobit P62 | RE probit (P62>0) |
|---|---|---|---|
| repeal (REP=1) | 4.596 | 2.756 | 0.273 |
| Control is no tax | (0.332) | (0.364) | (0.065) |
| | | | |
| Groups X REP | | | |
| 1-50% of P | 1.193 | 0.453 | 0.031 |
| | (0.837) | (0.901) | (0.863) |
| 51-99% of P | 2.798 | 1.536 | 0.007 |
| | (0.622) | (0.665) | (0.968) |
| 100% if P | -6.703 | 5.022 | -0.392 |
| | (0.536) | (0.458) | (0.237) |
| | | | |
| N | 4146 | 4146 | 4146 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P62 is the subjective probability to work full-time past 62.

| Females | tobit P62 | RE tobit P62 | RE probit (P62>0) |
|---|---|---|---|
| repeal (REP=1) | 5.773 | 2.757 | 0.316 |
| Control is no tax | (0.083) | (0.213) | (0.001) |
| | | | |
| Groups X REP | | | |
| 1-50% of P | 0.407 | 1.022 | 0.069 |
| | (0.924) | (0.713) | (0.563) |
| 51-99% of P | -1.198 | 1.328 | -0.143 |
| | (0.824) | (0.706) | (0.350) |
| 100% if P | -10.449 | -3.615 | -0.069 |
| | (0.448) | (0.684) | (0.867) |
| | | | |
| N | 5306 | 5306 | 5306 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P62 is the subjective probability to work full-time past 62.

**Figures**

**Figure 1 Expected Income, Claiming and First Period Hours of Work (Leisure)**
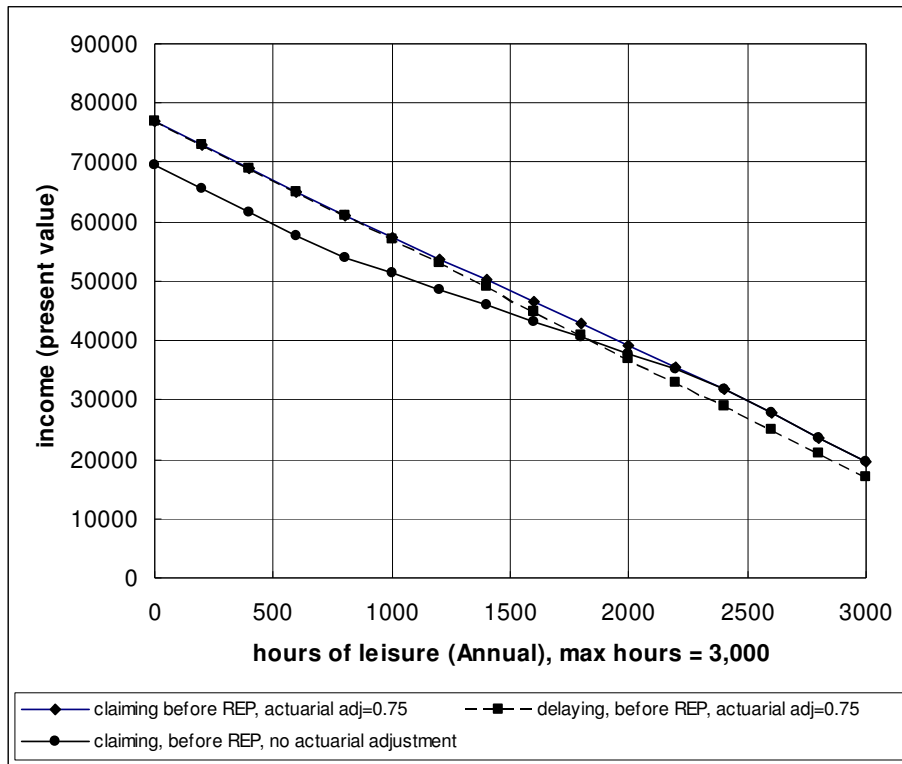
**Tables**

**Table 1 Parameters of the Earnings Test and Actuarial Adjustment 1992-2004**

| for those reaching the NRA in | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 |
|---|---|---|---|---|---|---|---|
| NRA | 65 | 65 | 65 | 65 | 65 | 65 | 65 4mo |
| Earnings Limit before NRA | 7,440 | 8,040 | 8,280 | 9,120 | 10,080 | 11,280 | 11,640 |
| Earnings Limit after NRA | 10,200 | 11,160 | 12,500 | 14,500 | None | None | None |
| Tax before NRA | 50% | 50% | 50% | 50% | 50% | 50% | 50% |
| Tax after NRA | 33% | 33% | 33% | 33% | 0% | 0% | 0% |
| Actuarial Reduction Factor (before NRA) | 6.8% | 6.8% | 6.8% | 6.8% | 6.8% | 6.8% | 6.8% |
| Delayed Retirement Credit (DRC) (after NRA) | 4.0% | 4.5% | 5.0% | 5.5% | 6.0% | 6.5% | 7.0% |

**Notes:** Earnings limit defined in rule §1803.2 of the Social Security Handbook 2004. Normal retirement age defined in §723.5. Delayed retirement credit §720.3. §724.1 defines the actuarial reduction factor.

**Table 2 HRS design**

| Birth year | DRC | NRA | Pre-Repeal | | | | Post-Repeal | | | HRS cohort |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | |
| 1918 | 3.50% | 65 | 74 | 76 | 78 | 80 | 82 | 84 | 86 | |
| 1919 | 3.50% | 65 | 73 | 75 | 77 | 79 | 81 | 83 | 85 | |
| 1920 | 3.50% | 65 | 72 | 74 | 76 | 78 | 80 | 82 | 84 | AHEAD |
| 1921 | 3.50% | 65 | 71 | 73 | 75 | 77 | 79 | 81 | 83 | |
| 1922 | 3.50% | 65 | 70 | 72 | 74 | 76 | 78 | 80 | 82 | |
| 1923 | 3.50% | 65 | 69 | 71 | 73 | 75 | 77 | 79 | 81 | |
| 1924 | 3.50% | 65 | 68 | 70 | 72 | 74 | 76 | 78 | 80 | |
| 1925 | 3.50% | 65 | 67 | 69 | 71 | 73 | 75 | 77 | 79 | |
| 1926 | 3.50% | 65 | 66 | 68 | 70 | 72 | 74 | 76 | 78 | |
| 1927 | 4.00% | 65 | 65 | 67 | 69 | 71 | 73 | 75 | 77 | CODA |
| 1928 | 4.00% | 65 | 64 | 66 | 68 | 70 | 72 | 74 | 76 | |
| 1929 | 4.50% | 65 | 63 | 65 | 67 | 69 | 71 | 73 | 75 | |
| 1930 | 4.50% | 65 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | |
| 1931 | 5.00% | 65 | 61 | 63 | 65 | 67 | 69 | 71 | 73 | |
| 1932 | 5.00% | 65 | 60 | 62 | 64 | 66 | 68 | 70 | 72 | |
| 1933 | 5.50% | 65 | 59 | 61 | 63 | 65 | 67 | 69 | 71 | |
| 1934 | 5.50% | 65 | 58 | 60 | 62 | 64 | 66 | 68 | 70 | |
| 1935 | 6.00% | 65 | 57 | 59 | 61 | 63 | 65 | 67 | 69 | |
| 1936 | 6.00% | 65 | 56 | 58 | 60 | 62 | 64 | 66 | 68 | HRS |
| 1937 | 6.50% | 65 | 55 | 57 | 59 | 61 | 63 | 65 | 67 | |
| 1938 | 6.50% | 65.02 | 54 | 56 | 58 | 60 | 62 | 64 | 66 | |
| 1939 | 7.00% | 65.04 | 53 | 55 | 57 | 59 | 61 | 63 | 65 | |
| 1940 | 7.00% | 65.06 | 52 | 54 | 56 | 58 | 60 | 62 | 64 | |
| 1941 | 7.50% | 65.08 | 51 | 53 | 55 | 57 | 59 | 61 | 63 | |
| 1942 | 7.50% | 66 | 50 | 52 | 54 | 56 | 58 | 60 | 62 | |
| 1943 | 8.00% | 66 | 49 | 51 | 53 | 55 | 57 | 59 | 61 | |
| 1944 | 8.00% | 66 | 48 | 50 | 52 | 54 | 56 | 58 | 60 | War Babies |
| 1945 | 8.00% | 66 | 47 | 49 | 51 | 53 | 55 | 57 | 59 | |
| 1946 | 8.00% | 66 | 46 | 48 | 50 | 52 | 54 | 56 | 58 | |
| 1947 | 8.00% | 66 | 45 | 47 | 49 | 51 | 53 | 55 | 57 | |
| 1948 | 8.00% | 66 | 44 | 46 | 48 | 50 | 52 | 54 | 56 | |
| 1949 | 8.00% | 66 | 43 | 45 | 47 | 49 | 51 | 53 | 55 | |
| 1950 | 8.00% | 66 | 42 | 44 | 46 | 48 | 50 | 52 | 54 | Early |
| 1951 | 8.00% | 66 | 41 | 43 | 45 | 47 | 49 | 51 | 53 | Boomers |
| 1951 | 8.00% | 66 | 41 | 43 | 45 | 47 | 49 | 51 | 52 | |
| 1952 | 8.00% | 66 | 40 | 42 | 44 | 46 | 48 | 50 | 51 | |
| 1953 | 8.00% | 66 | 39 | 41 | 43 | 45 | 47 | 49 | 50 | |

**Table 3: Sample of Workers aged 51-61**

| age | 1992 all | 1992 SS.Er | 1994 all | 1994 SS.Er | 1996 all | 1996 SS.Er | 1998 all | 1998 SS.Er | 2000 all | 2000 SS.Er | 2002 all | 2002 SS.Er | 2004 all | 2004 SS.Er |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 378 | 293 | 146 | 115 | 104 | 74 | 233 | 139 | 106 | 62 | 48 | 24 | 235 | 27 |
| 51 | 708 | 555 | 212 | 169 | 109 | 72 | 418 | 234 | 136 | 69 | 56 | 30 | 408 | 23 |
| 52 | 685 | 500 | 393 | 306 | 136 | 102 | 343 | 197 | 261 | 142 | 103 | 54 | 483 | 29 |
| 53 | 704 | 520 | 641 | 500 | 199 | 163 | 346 | 201 | 400 | 227 | 119 | 56 | 417 | 25 |
| 54 | 622 | 466 | 600 | 456 | 373 | 286 | 359 | 227 | 293 | 173 | 215 | 115 | 395 | 50 |
| 55 | 628 | 470 | 605 | 463 | 555 | 426 | 417 | 279 | 297 | 185 | 374 | 214 | 404 | 59 |
| 56 | 592 | 439 | 532 | 411 | 540 | 409 | 532 | 369 | 325 | 207 | 267 | 160 | 352 | 106 |
| 57 | 584 | 444 | 497 | 393 | 570 | 438 | 562 | 431 | 380 | 245 | 282 | 161 | 347 | 203 |
| 58 | 524 | 390 | 528 | 402 | 474 | 375 | 487 | 365 | 442 | 334 | 280 | 167 | 254 | 142 |
| 59 | 484 | 375 | 500 | 392 | 480 | 378 | 507 | 391 | 490 | 374 | 320 | 216 | 250 | 151 |
| 60 | 486 | 372 | 415 | 310 | 453 | 334 | 448 | 337 | 425 | 319 | 380 | 267 | 273 | 166 |
| 61 | 350 | 269 | 374 | 299 | 422 | 331 | 411 | 311 | 418 | 321 | 423 | 329 | 277 | 187 |
| Total | 6,745 | 5,093 | 5,443 | 4,216 | 4,415 | 3,388 | 5,063 | 3,481 | 3,973 | 2,658 | 2,867 | 1,793 | 4,095 | 1,168 |

**Table 4: Descriptive Statistics for Sample Age 51-61**

| | 1994 All | 1994 SS.Er | 1996 All | 1996 SS.Er | 1998 All | 1998 SS.Er | 2000 All | 2000 SS.Er | 2002 All | 2002 SS.Er | 2004 All | 2004 SS.Er |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| demographics (Mean) | | | | | | | | | | | | |
| age | 55.9 | 55.9 | 56.7 | 56.8 | 56.0 | 56.3 | 56.5 | 56.9 | 57.1 | 57.5 | 55.1 | 57.6 |
| widow | 0.05 | 0.06 | 0.05 | 0.06 | 0.05 | 0.05 | 0.05 | 0.06 | 0.05 | 0.05 | 0.04 | 0.06 |
| sep(or)div | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.13 | 0.15 | 0.11 |
| never married | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.02 |
| black | 0.15 | 0.14 | 0.15 | 0.13 | 0.14 | 0.13 | 0.13 | 0.12 | 0.14 | 0.12 | 0.14 | 0.11 |
| other race | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.03 | 0.04 | 0.03 | 0.04 | 0.03 | 0.08 | 0.03 |
| school yrs | 12.6 | 12.6 | 12.7 | 12.7 | 13.0 | 13.0 | 13.1 | 13.1 | 13.3 | 13.4 | 13.5 | 13.4 |
| health good | 0.30 | 0.30 | 0.30 | 0.30 | 0.32 | 0.33 | 0.29 | 0.29 | 0.32 | 0.32 | 0.31 | 0.33 |
| health fair/poor | 0.13 | 0.12 | 0.12 | 0.11 | 0.15 | 0.15 | 0.13 | 0.12 | 0.12 | 0.12 | 0.16 | 0.14 |
| Job Characteristics (Mean) | | | | | | | | | | | | |
| self-employed | 0.18 | 0.17 | 0.18 | 0.18 | 0.18 | 0.17 | 0.17 | 0.15 | 0.17 | 0.16 | 0.17 | 0.17 |
| tenure (yrs) | 13.6 | 13.5 | 13.3 | 13.2 | 13.5 | 13.3 | 13.5 | 13.5 | 13.2 | 13.3 | 12.7 | 12.9 |
| pressured to retire <65 by co-workers | 0.00 | 0.00 | 0.12 | 0.12 | 0.12 | 0.11 | 0.11 | 0.10 | 0.11 | 0.11 | 0.11 | 0.11 |
| transition low demanding job easy | 0.00 | 0.00 | 0.25 | 0.26 | 0.26 | 0.27 | 0.29 | 0.30 | 0.30 | 0.30 | 0.30 | 0.29 |
| Median wealth and earnings (USD 2004) | | | | | | | | | | | | |
| total fin. wealth | 144,621 | 141,863 | 145,532 | 144,943 | 141,131 | 140,550 | 153,932 | 154,482 | 159,973 | 154,710 | 161,000 | 170,500 |
| liquid fin. wealth | 19,169 | 19,164 | 18,704 | 18,885 | 18,585 | 17,424 | 24,739 | 26,388 | 28,416 | 26,311 | 14,000 | 22,000 |
| Total HH Income | 58,257 | 58,768 | 62,267 | 61,785 | 63,886 | 63,422 | 66,230 | 65,784 | 66,856 | 65,252 | 68,024 | 64,760 |
| Current AIME | | 2,018 | | 2,045 | | 2,273 | | 2,367 | | 2,370 | | 2,304 |
| % with pension plan | 0.567 | 0.575 | 0.569 | 0.575 | 0.587 | 0.594 | 0.611 | 0.620 | 0.590 | 0.592 | 0.590 | 0.588 |
| % with DC Plan | 0.270 | 0.281 | 0.305 | 0.314 | 0.361 | 0.366 | 0.360 | 0.369 | 0.359 | 0.366 | 0.411 | 0.388 |
| % with DB Plan | 0.370 | 0.373 | 0.343 | 0.344 | 0.338 | 0.343 | 0.330 | 0.336 | 0.314 | 0.311 | 0.296 | 0.312 |

**Notes:** Variable definitions in Appendix . All statistics are unweighted. Dollar amounts converted to $2004 using the BLS consumer price index.

**Table 5: Summary Statistics of Expectations for Workers Age 51-61**
**Males**

| mean and %>0 | probability work at 65 by year | | | | | |
|---|---|---|---|---|---|---|
| age | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
| 51-54 | 27.26 | 26.88 | 24.81 | 30.16 | 31.24 | 29.43 |
|  | 0.52 | 0.59 | 0.55 | 0.64 | 0.69 | 0.71 |
| 55-57 | 31.96 | 26.13 | 27.63 | 29.62 | 32.36 | 28.94 |
|  | 0.56 | 0.56 | 0.55 | 0.60 | 0.68 | 0.68 |
| 58-61 | 30.01 | 29.13 | 30.77 | 29.04 | 32.11 | 32.51 |
|  | 0.54 | 0.55 | 0.57 | 0.56 | 0.61 | 0.66 |
| Total | 29.32 | 27.45 | 28.79 | 29.50 | 31.98 | 31.20 |
|  | 0.53 | 0.57 | 0.56 | 0.59 | 0.64 | 0.67 |
| mean and %>66 | Age Expect to Claim Social Security Benefits by year | | | | | |
| age | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
| 51-54 | 63.46 | 63.45 | 63.64 | 63.83 | 64.41 | 64.26 |
|  | 0.04 | 0.04 | 0.06 | 0.07 | 0.12 | 0.09 |
| 55-57 | 63.42 | 63.38 | 63.55 | 63.86 | 63.82 | 64.14 |
|  | 0.04 | 0.04 | 0.05 | 0.08 | 0.08 | 0.11 |
| 58-61 | 63.65 | 63.46 | 63.72 | 63.64 | 63.70 | 64.00 |
|  | 0.05 | 0.05 | 0.07 | 0.08 | 0.08 | 0.11 |
| Total | 63.50 | 63.43 | 63.64 | 63.76 | 63.87 | 64.07 |
|  | 0.04 | 0.04 | 0.06 | 0.08 | 0.09 | 0.11 |

**Notes:** mean (including zeros) and % larger than 0 for each year and age group. Workers aged 51-61.

**Females**

| mean and %>0 | probability work at 65 by year | | | | | |
|---|---|---|---|---|---|---|
| age | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
| 51-54 | 22.14 | 19.78 | 20.80 | 23.21 | 24.86 | 22.91 |
|  | 0.46 | 0.49 | 0.47 | 0.54 | 0.57 | 0.59 |
| 55-57 | 20.51 | 20.91 | 25.78 | 22.82 | 25.69 | 27.35 |
|  | 0.42 | 0.47 | 0.52 | 0.51 | 0.55 | 0.62 |
| 58-61 | 22.65 | 20.92 | 23.35 | 23.88 | 28.75 | 28.02 |
|  | 0.43 | 0.44 | 0.45 | 0.50 | 0.59 | 0.58 |
| Total | 21.85 | 20.45 | 23.41 | 23.33 | 26.78 | 26.77 |
|  | 0.443 | 0.469 | 0.477 | 0.516 | 0.573 | 0.596 |
| mean and %>66 | Age Expect to Claim Social Security Benefits by year | | | | | |
| age | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 |
| 51-54 | 63.41 | 63.44 | 63.69 | 63.83 | 64.09 | 64.18 |
|  | 0.04 | 0.04 | 0.06 | 0.07 | 0.09 | 0.15 |
| 55-57 | 63.45 | 63.35 | 63.74 | 63.71 | 63.65 | 64.34 |
|  | 0.03 | 0.05 | 0.07 | 0.08 | 0.07 | 0.14 |
| 58-61 | 63.61 | 63.56 | 63.69 | 63.72 | 63.94 | 63.69 |
|  | 0.06 | 0.06 | 0.07 | 0.08 | 0.08 | 0.07 |
| Total | 63.47 | 63.45 | 63.71 | 63.75 | 63.91 | 64.00 |
|  | 0.04 | 0.05 | 0.07 | 0.08 | 0.08 | 0.11 |

**Notes:** mean (including zeros) and % larger than 0 for each year and age group. Workers aged 51-61.

**Table 6a: Expected Social Security Wealth and Incentives to Claim Social Security Benefits for those aged 51-61 from 1992 to 2004: Males**

**using life-table mortality rates**

| quantile | SS wealth 62 | relative to median | accrual (% of W62) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| 10th | 90,157 | 0.503 | 0.42 | -0.39 | -1.13 | -2.55 | -3.09 | -3.58 | -4.07 |
| 25th | 135,609 | 0.757 | 0.72 | -0.09 | -0.83 | -1.71 | -2.34 | -2.91 | -3.48 |
| Median | 179,091 | 1.000 | 1.32 | 0.48 | -0.30 | -1.03 | -1.65 | -2.27 | -2.88 |
| 75th | 213,326 | 1.191 | 1.81 | 0.91 | 0.10 | -0.46 | -0.77 | -1.52 | -2.21 |
| 90th | 233,987 | 1.307 | 2.59 | 1.64 | 0.80 | 0.11 | 0.06 | -0.72 | -1.46 |

**using subjective mortality rates**

| quantile | SS wealth 62 | relative to median | accrual (% of W62) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| 10th | 87,043 | 0.485 | -0.04 | -0.99 | -1.86 | -3.01 | -3.45 | -4.04 | -4.64 |
| 25th | 129,972 | 0.724 | 0.81 | 0.01 | -0.70 | -1.76 | -2.27 | -2.78 | -3.28 |
| Median | 179,536 | 1.000 | 1.47 | 0.65 | -0.09 | -0.79 | -1.33 | -1.90 | -2.45 |
| 75th | 219,491 | 1.223 | 2.09 | 1.27 | 0.54 | -0.10 | -0.40 | -1.06 | -1.65 |
| 90th | 245,663 | 1.368 | 2.85 | 1.95 | 1.16 | 0.57 | 0.39 | -0.31 | -0.97 |

**Notes:** median social security wealth at 62 for the sample aged 51-61 between 1992 and 2004. Expressed in $2004 USD. The accrual at age a is defined in terms of the % difference between the expected present value of social security wealth if claimed at $a+1$ compared to age $a$.

**Table 6b: Expected Social Security Wealth and Incentives to Claim Social Secutity Benefits for those aged 51-61 from 1992 to 2004: Females**

**using life-table mortality rates**

| quantile | SS wealth 62 | relative to median | accrual (% of W62) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| 10th | 37,432 | 0.209 | 1.65 | 0.87 | 0.18 | -0.34 | -0.96 | -1.54 | -2.05 |
| 25th | 85,422 | 0.477 | 2.52 | 1.67 | 0.93 | 0.21 | -0.16 | -0.75 | -1.31 |
| Median | 119,872 | 0.669 | 3.55 | 2.67 | 1.88 | 1.09 | 0.83 | 0.17 | -0.46 |
| 75th | 162,557 | 0.908 | 4.53 | 3.66 | 2.88 | 2.15 | 1.83 | 1.12 | 0.45 |
| 90th | 213,007 | 1.189 | 5.82 | 4.91 | 4.07 | 3.35 | 3.22 | 2.47 | 1.84 |

**using subjective mortality rates**

| quantile | SS wealth 62 | relative to median | accrual (% of W62) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 62 | 63 | 64 | 65 | 66 | 67 | 68 |
| 10th | 33,575 | 0.187 | 0.89 | 0.02 | -0.74 | -1.77 | -2.25 | -2.83 | -3.45 |
| 25th | 74,172 | 0.413 | 1.73 | 0.88 | 0.13 | -0.59 | -1.06 | -1.68 | -2.26 |
| Median | 108,499 | 0.604 | 2.84 | 1.95 | 1.15 | 0.42 | 0.16 | -0.51 | -1.14 |
| 75th | 150,337 | 0.837 | 4.00 | 3.12 | 2.33 | 1.57 | 1.31 | 0.58 | -0.08 |
| 90th | 201,923 | 1.125 | 5.28 | 4.36 | 3.56 | 2.88 | 2.69 | 1.97 | 1.33 |

**Notes:** median social security wealth at 62 for the sample aged 51-61 between 1992 and 2004. Expressed in $2004 USD. The accrual at age a is defined in terms of the % difference between the expected present value of social security wealth if claimed at $a+1$ compared to age $a$.

**Table 7a: Projected Loss from the Earnings Test before 2000: Males**

| | Predicted Loss due to the earnings test | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | age 62 | | | normal retirement age | | |
| | | forward-looking using | | | forward-looking using | |
| quantile | myopic | life-table | subjective | myopic | life-table | subjective |
| Loss in dollars | | | | | | |
| 10th | 0 | 0 | 0 | 0 | 0 | 0 |
| 25th | 3,003 | 868 | 832 | 0 | 0 | 0 |
| 50th | 12,020 | 3,485 | 3,010 | 6,913 | 1,549 | 1,114 |
| 75th | 15,300 | 4,387 | 3,698 | 15,486 | 3,473 | 2,785 |
| 90th | 16,856 | 4,758 | 4,336 | 21,201 | 5,451 | 4,727 |
| as fraction of earnings (positive earnings) | | | | | | |
| 10th | 0 | 0 | 0 | 0 | 0 | 0 |
| 25th | 0.193 | 0.055 | 0.043 | 0.091 | 0.016 | 0.005 |
| 50th | 0.239 | 0.069 | 0.059 | 0.191 | 0.039 | 0.030 |
| 75th | 0.292 | 0.084 | 0.080 | 0.233 | 0.062 | 0.055 |
| 90th | 0.327 | 0.095 | 0.098 | 0.251 | 0.077 | 0.075 |
| as fraction of current liquid assets (positive assets) | | | | | | |
| 10th | -0.571 | -0.162 | -0.159 | -0.289 | -0.064 | -0.052 |
| 25th | 0 | 0 | 0 | 0 | 0 | 0 |
| 50th | 0.087 | 0.025 | 0.021 | 0.057 | 0.013 | 0.008 |
| 75th | 0.439 | 0.127 | 0.115 | 0.310 | 0.075 | 0.059 |
| 90th | 2.128 | 0.603 | 0.555 | 1.404 | 0.347 | 0.292 |

**Notes**: workers aged 51-61 interviewed before 2000.

**Table 7b: Projected Loss from the Earnings Test before 2000: Females**

| | Predicted Loss due to the earnings test | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | age 62 | | | normal retirement age | | |
| | | forward-looking using | | | forward-looking using | |
| quantile | myopic | life-table | subjective | myopic | life-table | subjective |
| Loss in dollars | | | | | | |
| 10th | 0 | 0 | 0 | 0 | -174 | 0 |
| 25th | 0 | 0 | 0 | 0 | 0 | 0 |
| 50th | 4,852 | 727 | 1,095 | 575 | 0 | 0 |
| 75th | 9,463 | 1,413 | 2,067 | 5,811 | 448 | 750 |
| 90th | 12,882 | 1,895 | 2,720 | 11,730 | 1,311 | 1,940 |
| as fraction of earnings (positive earnings) | | | | | | |
| 10th | 0.000 | 0.000 | 0.000 | 0 | -0.007 | -0.001 |
| 25th | 0.077 | 0.009 | 0.018 | 0 | 0 | 0 |
| 50th | 0.216 | 0.031 | 0.041 | 0.076 | 0 | 0.002 |
| 75th | 0.264 | 0.039 | 0.060 | 0.170 | 0.017 | 0.026 |
| 90th | 0.294 | 0.045 | 0.077 | 0.217 | 0.035 | 0.049 |
| as fraction of current liquid assets (positive assets) | | | | | | |
| 10th | -0.318 | -0.047 | -0.076 | -0.01061 | -0.01384 | -0.0127036 |
| 25th | 0.000 | 0.000 | 0.000 | 0 | 0 | 0 |
| 50th | 0.022 | 0.003 | 0.005 | 0 | 0 | 0 |
| 75th | 0.240 | 0.035 | 0.052 | 0.100528 | 0.007395 | 0.0118125 |
| 90th | 1.338 | 0.195 | 0.320 | 0.612906 | 0.062906 | 0.0946192 |

**Notes**: workers aged 51-61 interviewed before 2000.

## Table 8: Unconditional Difference-in-Difference Grouping Estimates

| Myopic loss | Males | | | Females | | |
|---|---|---|---|---|---|---|
| % of benefit at NRA | Males: mean P65 (N=875) | | | mean P65 (N=632) | | |
| Group | 1998 | 2002 | Diff 2002-1998 | 1998 | 2002 | Diff 2002-1998 |
| 0 | 36.30 | 36.08 | -0.22 | 25.57 | 27.49 | 1.92 |
| 1 to 49% | 34.48 | 37.24 | 2.76 | 24.88 | 27.34 | 2.46 |
| 50 to 99% | 26.26 | 27.40 | 1.14 | 25.06 | 29.13 | 4.07 |
| 100% | 31.32 | 31.58 | 0.26 | 35.59 | 42.35 | 6.76 |
| Group | % P65>0 (N=875) | | | % P65>0 (N=632) | | |
| 0 | 65.91 | 65.15 | -0.76 | 53.36 | 55.37 | 2.01 |
| 1 to 49% | 65.50 | 72.49 | 6.99 | 57.91 | 61.39 | 3.49 |
| 50 to 99% | 67.46 | 68.25 | 0.79 | 56.15 | 65.24 | 9.09 |
| 100% | 73.68 | 73.68 | 0.00 | 64.71 | 70.59 | 5.88 |
| Group | %EC>NRA (N=829) | | | %EC>NRA (N=671) | | |
| 0 | 8.20 | 13.11 | 4.92 | 6.59 | 9.52 | 2.93 |
| 1 to 49% | 7.02 | 7.46 | 0.44 | 6.61 | 7.76 | 1.15 |
| 50 to 99% | 7.93 | 9.66 | 1.72 | 11.70 | 13.83 | 2.13 |
| 100% | 12.90 | 16.13 | 3.23 | 25.00 | 15.00 | -10.00 |

Notes: Sample of workers 51-61 who report in both waves.

## Table 9a: Conditional Difference-in-Difference Grouping Estimates for Males

| Males | tobit P65 | RE tobit P65 | RE probit (P65>0) | Conditional Logit (P65>0) | Ordered Probit (EC: <NRA, NRA, >NRA)) | RE probit (EC>NRA) |
|---|---|---|---|---|---|---|
| repeal (REP=1) | 1.963 | 1.253 | 0.114 | -0.132 | -0.161 | 0.383 |
| Control is no tax | (0.640) | (0.632) | (0.437) | (0.773) | (0.098) | (0.049) |
| | | | | | | |
| Groups X REP | | | | | | |
| 1-50% of P | 9.927 | 5.944 | 0.448 | 0.783 | 0.047 | -0.090 |
| | (0.053) | (0.058) | (0.010) | (0.023) | (0.688) | (0.698) |
| 51-99% of P | 10.388 | 7.505 | 0.229 | 0.233 | 0.113 | 0.217 |
| | (0.040) | (0.015) | (0.169) | (0.475) | (0.329) | (0.342) |
| 100% if P | -4.431 | 3.033 | 0.018 | 0.184 | -0.059 | -0.375 |
| | (0.638) | (0.601) | (0.954) | (0.744) | (0.768) | (0.314) |
| | | | | | | |
| N | 4146 | 4146 | 4146 | 1166 | 3791 | 3791 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P65 is the subjective probability to work full-time past 65. EC represents the age at which the respondent expects to claim Social Security Benefits. REP is a dummy variable that takes value 1 for 2000 and 2002 observations. The grouping is done by the share of benefits loss at NRA. Controls for age dummies, demographics, job characteristics, current financial resources and projected social security wealth and accrual at age 62 as well as AIME. Full results in Appendix.

## Table 9b: Conditional Difference-in-Difference Grouping Estimates for Females

| Females | tobit P65 | RE tobit P65 | RE probit (P65>0) | Conditional Logit (P65>0) | Ordered Probit (EC: <NRA, NRA, >NRA)) | RE probit (EC>NRA) |
|---|---|---|---|---|---|---|
| repeal (REP=1) | 8.225 | 4.630 | 0.326 | 0.005 | -0.291 | 0.195 |
| Control is no tax | (0.007) | (0.026) | (0.000) | (0.987) | (0.000) | (0.171) |
| | | | | | | |
| Groups X REP | | | | | | |
| 1-50% of P | 1.810 | 2.394 | 0.127 | 0.334 | 0.126 | 0.101 |
| | (0.644) | (0.360) | (0.264) | (0.127) | (0.167) | (0.571) |
| 51-99% of P | 0.458 | 1.956 | 0.066 | 0.139 | 0.074 | -0.171 |
| | (0.925) | (0.550) | (0.647) | (0.604) | (0.496) | (0.388) |
| 100% if P | -6.206 | -2.709 | -0.365 | -0.890 | -0.225 | -0.164 |
| | (0.617) | (0.736) | (0.339) | (0.247) | (0.396) | (0.702) |
| | | | | | | |
| N | 5306 | 5306 | 5306 | 1745 | 4363 | 4363 |

**Notes:** Sample of workers aged 51-61 from 1996 to 2002. Pvalue under parameter estimates. P65 is the subjective probability to work full-time past 65. EC represents the age at which the respondent expects to claim Social Security Benefits. REP is a dummy variable that takes value 1 for 2000 and 2002 observations. The grouping is done by the share of benefits loss at NRA. Controls for age dummies, demographics, job characteristics, current financial resources and projected social security wealth and accrual at age 62 as well as AIME. Full results in Appendix.

**Table 10 Actual Claiming Decisions and Differences between Actual and Expected Claiming Age**

| mean deviation | Deviation | | Diff | claim at NRA | | Diff |
| | turning 65 in | | | turning 65 in | | |
| N | 1998 | 2000 | 2000-1998 | 1998 | 2000 | 2000-1998 |
|---|---|---|---|---|---|---|
| gender | | | | | | |
| female | 0.086 | -0.451 | -0.537 | 0.800 | 0.837 | 0.037 |
| | 70 | 73 | | 70 | 73 | |
| male | 0.430 | -0.433 | -0.863 | 0.701 | 0.832 | 0.131 |
| | 93 | 90 | | 93 | 90 | |
| fraction benefit loss | | | Diff 2000- | | | Diff 2000- |
| at NRA | 1998 | 2000 | 1998 | 1998 | 2000 | 1998 |
| 0 | -0.200 | -0.154 | 0.046 | 0.862 | 0.862 | 0.000 |
| | 35 | 39 | | 35 | 39 | |
| 1-50% | -0.222 | -0.225 | -0.003 | 0.781 | 0.880 | 0.099 |
| | 45 | 40 | | 45 | 40 | |
| 51-99% | 0.487 | 0.029 | -0.458 | 0.712 | 0.795 | 0.084 |
| | 39 | 35 | | 39 | 35 | |
| 100% | -0.222 | -0.779 | -0.557 | 0.571 | 0.840 | 0.269 |
| | 18 | 18 | | 18 | 18 | |

**Notes:** sample of respondents who turn 65 in given wave, have not claimed before 65 and will not claim after age 69 (for deviations). The variable in the deviation is the difference between the age at which benefits were claimed and the age at which the respondent expected to claim as of previous wave. For the second panel, the fraction of respondents turning 65 and claiming is presented.

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