New Evidence on Earnings and Benefit Claims Following the Removal of the Retirement Earnings Test in 2000

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Abstract

This paper examines responses in the labor force activity of workers aged 65-69 in response to the removal of the retirement earnings test in the year 2000. We use the one-percent sample of Social Security administrative data that covers the period from four years prior to four years following the removal of the test (that is, 1996 through 2003). The paper uses a difference-in-difference method on pooled cross-section data on work participation, earnings, and retirement-benefit entitlement status for individuals aged 65-69 by including two samples as control groups: individuals aged 62-64 and those aged 70-72. Findings from this paper indicate that after the earnings test removal in 2000, earnings in the higher percentiles (the 50^{th} to 80^{th} percentiles) increased, indicating that the effects of the removal are limited to earnings levels just around the test threshold. Further, work participation among individuals aged 65-69 increased between 1 and 2 percentage points after the removal, and applications for benefits accelerated by 2 to 5 percentage points among individuals aged 65-69.

I. Introduction

The retirement earnings test, which has been part of the Social Security Old Age, Survivors, and Disability Insurance (OASDI) program since its inception in 1935, has been gradually modified by exempting certain age groups, increasing allowable earnings, and decreasing withholding rates. A rationale for modifications is to encourage older people to work so that their earnings can supplement their Social Security benefits as people live longer and healthier lives. The most recent major modification occurred in April 2000 when Congress enacted a new law, the Senior Citizens Freedom to Work Act of 2000, which removed the earnings test for individuals at the full retirement age (FRA), age 65 and over.[1] The 2000 test removal can be considered to be one of the most substantial changes in recent years because it affects both the youngest of those who have reached the FRA and a wider range of age groups than had other modifications.

Although the earnings test compensates individuals for postponing benefit entitlement by increasing their future benefit streams through both the delayed retirement credit (DRC) and automatic benefit recomputation, those adjustments are not considered to be actuarially fair.[2] That is, the earnings test is viewed as a tax on earnings above the test threshold, causing both a reduction in work effort (for example, hours of work, earnings, and work participation) of old-age beneficiaries and a delay in applications for Old-Age benefits. This tax aspect of the earnings test causes kinks in the budget constraint in a static labor supply model (Burtless and Moffit (1985) and Friedberg (2000)). Removing the earnings test causes a decline in the marginal tax rate for those who earn above the threshold.

A number of studies have analyzed how incentives generated by Social Security program rules have affected work participation and benefit claims. Those studies relied primarily on cross-sectional variations in benefit amounts as identification information (see

[1] The full retirement age has been 65 for those who reach 62 in 2000 or earlier, and it gradually increases to 67 for beneficiaries who reach age 62 in 2022 or later. The law was enacted April 7, 2000, but the elimination of the earnings test for beneficiaries was effective for taxable years ending after December 31, 1999. Earnings tests for individuals aged 75 or older, aged 72-74, and aged 70-71 were eliminated in 1950, 1954, and 1983, respectively (Annual Statistical Supplement to the Social Security Bulletin (2003)).
[2] An alternative explanation for the observation that people bunch at the kink and respond to changes in the earnings test rules is that the DRC and automatic benefit recomputation are not actuarially fair. See Friedberg (2000).

Krueger and Meyer, 2002, for an overview and survey). In response to the identification problem caused by the fact that all workers face an identical benefit schedule in the Social Security system, the earnings test has drawn attention from economists who seek to investigate the labor supply disincentive effect of Social Security program rules. Three recent studies, Friedberg (2000), Gruber and Orszag (2000), and Haider and Loughran (2005), used the experimental approach by noting that modifications of the earnings test affected some groups but not others.[3] While Friedberg's results indicated a small but significant effect of the earnings test on the labor supply of older workers, Gruber and Orszag indicated that the earnings test had no robust influence on the labor supply and appeared to accelerate benefit receipt among eligible individuals. Results reported in Haider and Loughran (2005) indicated that the earnings test has substantial impact on hours worked and benefits claimed for men. Baker and Benjamin (1999) and Disney and Tanner (2000) examined the elimination of a similar earnings test in Canada and the United Kingdom. Disney and Tanner (2000) reported that the elimination of the earning test increased male work hours in the U.K. by about 4 hours per week. Baker and Benjamin (1999) found a shift from part-time to full-time work among Canadian men aged 65-69.

Given the number of workers affected and their relatively high rates of work participation, the removal of the earnings test in 2000 provides a rare opportunity to study the disincentive effects on labor supply aspects of Social Security programs using an experimental framework.[4] Unlike other studies, this study focuses on the most significant single event in the history of the U.S. earnings test.[5] The purpose of this study is to provide comprehensive empirical evidence on the effects of removing the earnings test by using a large and accurate SSA administrative data set that covers from four years prior

[3] Friedberg investigated three changes in earnings test rules in 1978, 1983, and 1990. Effects reported in Gruber and Orszag (2000) for 1973-1998 and in Haider and Loughran (2005) for 1995-2003 are identified by all changes, including gradual increases in the test threshold in each year. See Leonesio (1990) for reviews of and references to early studies on the earnings test.

[4] Work participation rates among those aged 65-69 were nearly 30 percent just prior to the removal of the earnings test and benefit entitlement rates were approximately 90 percent (see Table 2).

[5] Song (2003/ 2004) examined the 2000 earnings test removal using SSA administrative data matched with the Survey of Income and Program Participation (SIPP). Although the study uses innovative data sources,

to four years following the removal. By including four years of data after the removal, we are able to investigate reactions not only immediately following the removal but also for several years after. This extended period can aid our understanding of dynamic responses to changes in the relative price of labor among older workers, some of whom face substantial constraints on re-entering the labor force because of deteriorating health and outdated skills. Further, by using quantile (percentile) regression methods, we are able to examine the uneven impact of the earnings test removal across the distribution of earnings. That uneven impact, predicted by the kinked budget constraint in the presence of the earnings test, represents a key problem with using reduced form analysis of the earnings test.

The remainder of this paper is divided into five sections. Section II reviews the earnings test rules and the theoretical prediction of how people will respond to the removal of the test. Section III discusses our identification strategy and the data set used. Section IV presents descriptive results. Section V presents regression results on benefit claims (entitlements), work participation, and earnings. Section VI concludes the paper.

II. Earnings test rules and theoretical prediction

A. Retirement Earnings Test

The retirement earnings test operates in a relatively simple manner. Current Social Security benefits are reduced if earnings exceed the threshold amounts, and the reduction in benefits is somewhat offset by future benefit increases through the delayed retirement credit (DRC) and benefit recomputation. Thus, the earnings test has both "tax" and "transfer" features. The tax feature of the earnings test includes both threshold amounts and withholding rates. The threshold amount varies by the year in which the test applies and by the ages of the beneficiaries. For example, the thresholds for those aged 65-69 as of 1996, 1997, 1998, and 1999 were $12,500, $13,500, $14,500, and $15,500 and for those aged 62-64 were $8,280, $8,640, $9,120,and $9,600, respectively. The benefit

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his analysis focused on the initial impact of the removal of the test by covering only the first year following the removal.

withholding rate was $1 for each $3 of earnings above the earnings test threshold for individuals aged 65-69, and $1 for each $2 for those aged 62-64.

Following the earnings test removal in 2000, beneficiaries who have not reached the full retirement age by the end of the prior year are still subject to the test. Social Security benefits of those aged 62-64 are reduced by $1 for every $2 earned beyond the threshold, which was $11,520 in 2003. Those who reach the full retirement age in a year in which the test applies are subject to a more moderate test. Benefits are reduced $1 for every $3 earned beyond the threshold, which was $30,720 in 2003[6]. Thus, the 2000 earnings test removal not only eliminated the test for those who had attained ages 65-69 (more precisely, FRA to 69), but it also considerably relaxed the test for those turning 65 (FRA).[7]

The transfer aspect of the earnings test, often overlooked due to the focus on the tax aspect, compensates the withholding of benefits by increasing the beneficiary's future benefit stream. Two features in the Social Security rules compensate individuals subject to the earnings test: the delayed retirement credit (DRC) and benefit recomputation. The future benefits for individuals who have not received benefits because of the earnings test (or for any other reason) are increased for each month of benefit non-payment. This increase is 1/4 of one percent for each month, plus 1/24 of one percent for each even numbered year, from 1990 through 2008, in which workers are at the FRA or older. Thus, for those who turned 65 in 2000-2001, the DRC is 1/2 of one percent for each incremental month, or 6 percent per year.[8] A benefit recomputation rule may apply to those who become entitled to benefits but who subsequently have substantial covered earnings. The recomputation credits any substantial additional covered earnings in the

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[6] See the Annual Statistical Supplement to the Social Security Bulletin (2003), pages 240-241, for a brief history of changes in the retirement earnings test..

[7] The removal eliminated the test beginning with the month a beneficiary reaches the FRA. In determining annual earnings for test purposes, only earnings before the month of attaining the FRA are considered. Note that the FRA gradually increases beginning with individuals born in 1938 or later. Since those who were born in 1938 reach the FRA in 2003, most of them (those born in March or later because the FRA is 65 and 2 months for the 1938 cohort) are subject to the 62-64 earnings test through 2002 and the modified earnings test in 2003.

[8] Note that for early-benefit claimants, monthly benefits are reduced from the full benefit amount at the rate of 5/9 of 1 percent per month for the first 36 months and 5/12 of 1 percent for any additional months. The DRC for those who reach 65 in 2002-2003 is 13/24 of 1 percent for each incremental month (or 6.5 percent per year).

year the individual becomes entitled to benefits or in a later year. The recomputation can increase benefits when earnings in the additional years are higher than the lowest earnings used in the current computation (see Social Security Handbook (2003)).

The earnings test does not apply to individuals who are entitled to benefits because of disability or who are living outside of the U.S if their work is not covered by Social Security. When earnings exceed the test threshold, the total family benefit is reduced accordingly, including all benefits (other than Disability Insurance) payable to anyone in the family entitled to benefits on the primary earner's earnings record. For earnings test purposes, an individual's earnings for the entire taxable year are counted, even if the individual has not been entitled for the entire year.[9] In addition, self-employment earnings are counted for the year in which they are received, regardless of when they are earned.[10] Countable income for the earnings test includes wages from covered employment, cash payments for agricultural or domestic work, cash tips, and pay for work not covered by Social Security if the work is done in the U.S.

B. Theoretical prediction

To analyze the effects of the earnings test on work and benefit claims, we consider the budget constraint of a typical individual aged 65-69 who is planning her consumption, work, and future retirement benefit entitlement, in a two-period framework: a period of working and receiving the full benefit amount or less ($t=1$) and a period of not working ($t=2$). The two-period budget constraint in the presence of the retirement earnings test takes the following form:

$$A+\left(w_1 H + bd - \max\left[0, \min\left[b, \frac{1}{3} w_1 (H-h_{tr})\right]\right] d \right) +$$

$$(1+\gamma)^{-1}\delta b' \left(1 + \left(\frac{\max\left[0, \min\left[b, \frac{1}{3} w_1 (H-h_{tr})\right]\right]}{b} \theta \right) d + \theta(1-d) \right) - C = 0,$$

[9] A monthly earnings test can be applied when earnings do not exceed the monthly exempt amount and no 'substantial services' in self-employment are performed (see Social Security Handbook).

[10] Thus, deferred compensation is also counted for earnings test purposes.

where C denotes consumption ($= c_1 + (1+\gamma)^{-1} c_2$), H is labor hours ($= h_1$), A indicates initial wealth, γ is the interest rate, b is the full-benefit amount, b' is the benefit amount after recomputations and cost-of-living adjustments (thus, $b < b'$), θ denotes the DRC factor in percentage, d indicates benefit claim choice, h_{tr} indicates the earnings-test threshold, w_t is the wage rate, and δ denotes the length of period 2 relative to period 1.[11]

The trade-off between consumption (C) and labor hours (H) under the earnings test depends on the level of labor hours (H) relative to the earnings-test threshold (h_{tr}) and the benefit claim choice (d). The trade-off between C and H is represented by a piecewise linear budget constraint with three segments.[12]

$$C = \left(A + bd + (1+\gamma)^{-1}\delta b'\left(1+\theta(1-d)\right)\right) + w_1 H \text{, if } 0 < H < h_{tr}; \qquad (1)$$

$$C = \left(A + bd + (1+\gamma)^{-1}\delta b' + \frac{1}{3} w_1 h_{tr} d - (1+\gamma)^{-1}\delta b'\left(\frac{1}{3}\frac{w_1 h_{tr}}{b}\theta d - \theta(1-d)\right)\right)$$
$$+ w_1 H\left(1 - \frac{1}{3}d + \frac{1}{3}(1+\gamma)^{-1}\delta\frac{b'}{b}\theta d\right) \text{, if } h_{tr} < H < h_{up} \text{; and} \qquad (2)$$

$$C = \left(A + (1+\gamma)^{-1}\delta b'(1+\theta)\right) + w_1 H \text{, if } h_{up} < H. \qquad (3)$$

The corresponding budget constraint in the absence of the earnings test is a straight line, with slope w_1 and intercept $A + bd + (1+\gamma)^{-1}\delta\left(b' + (1-d)\theta\right)$, which is equivalent to the constraint $0 < H < h_{tr}$ extended to maximum labor hours.

Ignoring the transfer aspect (DRC) of the earnings test would be equivalent to assuming that $\theta = 0$. Then, it can be seen that 1) $\left(1 - \frac{1}{3}d + \frac{1}{3}(1+\gamma)^{-1}\delta\frac{b'}{b}\theta d\right) \le 1$; and 2) $\left(A + bd + (1+\gamma)^{-1}\delta b' + \frac{1}{3} w_1 h_{tr} d - (1+\gamma)^{-1}\delta b'\left(\frac{1}{3}\frac{w_1 h_{tr}}{b}\theta d - \theta(1-d)\right)\right) \ge$

[11] We make the following simplifying assumptions: 1) the benefit recomputation is considered in the second period; 2) the second period is considered to be an absorbing state where all individuals receive full benefit amounts plus any adjustments ($b \le b'$) and work zero hours ($h_2 = 0$).

[12] h_{tr} (threshold) is hours of work corresponding to the earnings test threshold and h_{up} (upper kink) is hours of work corresponding to the exhaustion of benefits.

$\left(A + bd + (1+\gamma)^{-1}\delta b'\left(1+\theta(1-d)\right)\right) \geq \left(A + (1+\gamma)^{-1}\delta b'\left(1+\theta\right)\right)$.[13] Thus, the budget constraint takes the familiar shape shown in Burtless and Moffit (1985) and Friedberg (2000). It has two kinks ($H = h_{tr}$, $H = h_{up}$), and three segments ($0 < H < h_{tr}$, $h_{tr} < H < h_{up}$, $h_{up} < H$).

When the transfer aspect of the earnings test is considered, the intercept and slope of the budget constraint change, depending on whether the transfer is actuarially fair or not. More specifically, the actuarial fairness of the transfer depends on whether $\left((1+\gamma)^{-1}\delta\frac{b'}{b}\theta\right)$ is greater than, less than, or equal to 1.[14] When the transfer is less than fair, removing the earnings test is equivalent to reducing the marginal tax rate. That is, removing the earnings test would yield a negative income effect and a positive substitution effect when $h_{tr} < H$. However, the magnitude of the net effect would depend on the sizes of the income and substitution effects. While labor-hour choices when $h_{tr} > H$ would not be (directly) affected by the test removal, the choices might be indirectly affected via a change in the benefit entitlement choice (d). When $h_{tr} \le H \le h_{up}$ and $h_{up} < H$, removing the earnings test causes a shift in the budget constraint.

The opportunity sets show that the trade-off between consumption (C) and benefit entitlement choice (d) consists of two points: $\left(0, A + w_1 H + (1+\gamma)^{-1}\delta b'(1+\theta)\right)$ and

[13] The equality holds when $d = 0$.

[14] It is more than fair when $\left((1+\gamma)^{-1}\delta\frac{b'}{b}\theta\right) > 1$, unfair when $\left((1+\gamma)^{-1}\delta\frac{b'}{b}\theta\right) < 1$, and exactly fair when $\left((1+\gamma)^{-1}\delta\frac{b'}{b}\theta\right) = 1$. See Burkhauser and Turner (1981) and Blinder, Gordon, and Wise (1981) for discussion on the degree of fairness.

$$\left(1, A+\left(w_1 H + b - \max\left[0, \min\left[b, \frac{1}{3} w_1 (H - h_{tr})\right]\right]\right) + (1+\gamma)^{-1} \delta b' \left(1 + \left(\frac{\max\left[0, \min\left[b, \frac{1}{3} w_1 (H - h_{tr})\right]\right]}{b} \theta\right)\right)\right),$$

where the first and second elements correspond to d and C, respectively. The corresponding opportunity sets in the absence of the earnings test are $\left(0, A + w_1 H + (1+\gamma)^{-1} \delta b'(1+\theta)\right)$ and $\left(1, A + w_1 H + b + (1+\gamma)^{-1} \delta b'\right)$. Thus, the earnings test removal will affect Old-Age workers' choices of d as long as $-\max\left[0, \min\left[b, \frac{1}{3} w_1 (H - h_{tr})\right]\right] +$

$$(1+\gamma)^{-1} \delta b' \left(\frac{\max\left[0, \min\left[b, \frac{1}{3} w_1 (H - h_{tr})\right]\right]}{b} \theta\right) \neq 0.$$

That is, removing the earning test would not affect benefit claim choices if current benefit withholdings are exactly compensated by future benefit increases.

The two-period budget constraint shows that removing the earnings test will affect individuals' hours of work and benefit claim choices as long as current benefit withholdings are not exactly compensated by future benefit increases. With the earnings test for individuals aged 65-69 in place, those in that age group could "lend" their current benefits in exchange for future increased benefits, either by not claiming current benefits or by working such that their earnings are above the threshold amount. Following the removal of the earnings test, lending is possible only by not claiming benefits. Whether the earnings test affects older workers' earnings and benefit entitlement choices depends on the ratio of the rates of return at which individuals are willing to lend (not claim, or claim benefits and work above the threshold) to the rates that are being offered to them through program-specific rules (DRC, benefit recomputation, and cost of living adjustment (COLA)).

III. Data and Identification Strategy

A. Data

This study uses data from an extract of the Social Security Administration (SSA) one-percent (active) sample, frequently known as the Continuous Work History Sample (CWHS) active file.[15] Once a person is selected, he or she stays in the active sample for life. The one-percent samples are selected by a "stratified cluster design" based on Social Security number (SSN). That is, the samples are selected based on certain serial digits of the SSN and are generally considered to be random samples. For selected SSNs, information on annual earnings (both capped and uncapped), OASDI benefit entitlements, and death records, if any, are obtained from several SSA administrative files. The sources for the CWHS include the master earnings file (MEF), the Numident, and the master beneficiary record (MBR). The Numident is a numerically-ordered master file of assigned SSNs that contains birth and death dates, place of birth, race, and sex. The MEF contains annual FICA summary earnings from 1937 to the present, as well as annual detailed earnings and Medicare taxable and total compensation from 1978 to the present for the U.S. population. The earnings records are taken directly from W-2 forms. A MEF record is created when the corresponding Numident record is created. The MBR file contains data related to the administration of the OASDI program such as application and entitlement dates, benefit amounts, payment status, type of benefits, and demographic information. An MBR record is established whenever an individual applies for benefits and the application is processed.[16]

The one-percent extract of SSA administrative records provides several advantages over other data used for studying the effects of the earnings test. First, the one-percent extract contains accurate annual earnings records, not plagued by the self-reporting problems that are common in survey-based records. Since the earnings test is carried out based on earnings amounts rather than on labor hours, accurate earnings data are crucial for this study. We use Medicare taxable earnings because deferred earnings are taxed for

[15] There are two versions of the CWHS: active and inactive files. The active file includes individuals with earnings from any employment, whether from covered or uncovered work.
[16] For further discussions on the MEF, MBR, and other SSA administrative files, see Panis *et al*. (2000).

Medicare purposes and counted for purposes of the earnings test.[17] Second, SSA data contain the exact time of entitlement for Old Age benefits. For the earnings test, individuals' earnings for an entire taxable year are counted even if the individuals were not entitled to benefits for the entire year. Hence, whether or not an individual becomes entitled to retirement benefits during a given year is also crucial information. Third, the one-percent sample contains a large number of observations that represents the general population. Some disadvantages exist as well, however. We have no information on hours of work or other covariates that are crucial in labor supply models, such as wages, other income, health status, education, and family characteristics. Hence it is not possible to use the data to estimate a structural model of labor supply.

In this study, we focus on primary workers because if the earnings test affects labor supply (or earnings), it would affect primary workers rather than survivors or dependents. Primary-worker beneficiaries are the largest group among Old-Age and Survivors Insurance (OASI) beneficiaries; they constituted approximately 83 percent of total OASI beneficiaries in 2002 (Annual Statistical Supplement to the Social Security Bulletin, 2003). Further, while earnings of primary-worker beneficiaries that exceed the test threshold cause reductions in total family benefits, including benefits to spouses and children, excess earnings of a survivor or a dependent beneficiary reduce her monthly benefits only. A worker must be fully insured before retirement benefits can be paid to her or to her family. Thus, we subset our sample to include individuals who have accumulated at least 40 quarters of coverage between the year they turn age 21 and the year they reach 62.[18] Our analytical samples exclude Social Security Disability Insurance (SSDI) beneficiaries, Old-Age beneficiaries converted from DI benefits, and those who are not fully insured under Social Security.

[17] Further, beginning in 1994, Medicare taxes all covered wage and self-employment income, including deferred compensation, without limit (taxable max).
[18] Workers born before 1929 need less than 40 quarters of coverage to be fully insured (see Social Security Handbook).

B. Defining treatment and control groups

The main features of the 2000 earning test removal are 1) the complete elimination of the earnings test for individuals who have attained age 65 as of December 31st of a year prior to the relevant year ; and 2) a modified earnings test with significantly increased test threshold amounts for those who turn 65 during the relevant year.[19] Hence we consider two separate treatment groups: those who turn 65 during the year and those who have attained ages 65-69 by January 1st of a particular year. As control groups, we consider those both older and younger than the treatment groups: individuals turning 62-64 and those who have attained ages 70-72.[20] During the study period, those who had attained 70-72 faced no earnings test, while those turning 62-64 faced the same test rules, except that the threshold amounts were gradually increased. As a result, there are two treatment groups and two control groups in each calendar year from 1996 through 2003: those turning 65 during the test year -- the younger treatment group; those who have attained ages 65-69 -- the older treatment group; those turning 62-64 -- the younger control group; and those who have attained ages 70-72 -- the older control group.

The "treatment" in this study depends on both time and age because earnings test rules are specific to age as well as calendar year. Thus, we cannot fully take advantage of the longitudinal format of the SSA administrative data in defining treatment and control groups. Instead, we arrange the data such that each yearly cross-section covers the age range 62-72, as shown in Table 1. The dependent variables of our study, earnings and labor force participation as well as benefits claiming, are functions of the passage of time (aging); different age groups have their own time trends arising from interactions of group- and time-specific effects on the outcome variables. Thus, by defining control groups to include exactly the same age range in each year, we hope that our control groups can isolate both age- and year-specific effects. By including both older and

[19] For example, those who were born in 1935 are turning 65 in 2000 and those who were born in 1934 through 1930 have attained 65-69 as of December 31st of 1999. In 2000, therefore, the modified earnings test applies for those who were born in 1935, while the test no longer applies to those who were born in 1934 through 1930.

[20] For example, those who were born in 1936 through 1938 are turning 62-64 in 2000 and those who were born in 1927 through 1929 have attained 70-72 as of December 31st of 1999.

younger age groups as control groups, we further expect to learn more about the dynamics of labor supply in response to the removal of the earnings test.[21]

Our study period covers four years prior to and four years following the removal of the earnings test (that is, from 1996 through 2003) for the following reasons. First, data through 2003 are available today. Second, by including a multiple-year period prior to the removal of the earnings test, we are able to test whether the outcome measures for the treatment and control groups are comparable during the pre-removal period. The fundamental identification assumption in this kind of model is that the mean (or other measure) change in outcome in the absence of the treatment is the same for both the treated and the non-treated groups. We test this assumption by asking whether or not the coefficients of the treatment dummies (the treatment-group dummies interacted with calendar years) for 1996 through 1999 equal zero. Third, by including multiple years following the test removal, we are able to examine responses, particularly in work participation and hours, for several years after the removal as well as immediately after the removal. One would expect that immediate responses to the test removal might differ from longer-term responses because a person aged 65-69 who has been out of the labor force may require a difficult and costly job search in order to return to the labor market.

Sample sizes by calendar years vary from 168,486 to 178,217 depending on the reference year (see Table 1). The age range of the sample in each year is exactly the same over the reference period. The race and sex variables show that approximately 88 percent are white and 54 percent are male.

IV. Descriptive analyses on work and retirement among workers aged 62-72

From 1996 through 2003, the data show movements in work participation and benefit entitlement of the treatment groups relative to the control groups (see Table 2). If our

[21]We also expect that including both control groups improves the efficiency of our estimate. Meyer (1995) suggested that "the more similar the comparison group is to the treatment group the better" and that "for a given degree of similarity with the treatment group, greater differences across comparison groups are desirable …."

control groups are valid, we expect to see parallel movements of the same outcome variables of the treatment and control groups during the pre-2000 period. Table 2 shows noticeable differences in work participation and benefit entitlements between the treatment and control groups. Work participation rates during the post-removal period among those in the age groups 62-64, 65, 65-69, and 70-72 are approximately 52-55 percent, 40-44 percent, 26-29 percent, and 16-18 percent, respectively. At the beginning of each reference year, Old-Age benefit entitlement rates during the pre-removal period for the four groups are approximately 21 percent, 63-65 percent, 88-89 percent, and 91-92 percent, respectively. Despite the relatively parallel movements of work-participation and benefit-entitlement rates during the pre-removal period, considerable variations occur in the levels of these rates among the four groups.

The percentage of beneficiaries who became entitled in 1999 and 2000 increased from 22 to 28 percent for the younger treatment group (those who were turning 65). Over the same period, the percentage nearly doubled for the older treatment group (those who had attained ages 65-69). During the post-removal period, benefit-entitlement rates increased slightly for the two older age groups, but they decreased slightly for the two younger age groups. Work-participation rates increased slightly for all four groups: 55-56 percent, 45 percent, 31-32 percent, and 19-20 percent, respectively. Work-participation rates tended to rise slightly year by year over the study period. Benefit-entitlement rates among those aged 64 or younger tended to fall slightly, but rates for those aged 65 or older tended to increase slightly over time.

Although these descriptive results show no clear evidence of effects of the earnings test removal on work-participation rates, they suggest that benefit-entitlement rates are somewhat higher after the removal. The magnitude of the increase does not appear to be large, perhaps because most individuals have already become entitled to Old Age benefits before they reach age 65. Benefit-entitlement rates for workers aged 62-64 during the pre-removal period appear to be lower than rates during the post-removal period.

The large sample size and the longitudinal format of our data allow us to construct transition matrices so that we can follow those of a particular age from one year to the next. For each age 65 through 69 as of the end of year t1, Figure 1 presents joint probabilities of transitions from 'not-work' in year t1 to 'work' in year t2, and from 'work' to 'work' from 1996 through 2003. Similarly, Figure 2 presents age-specific probabilities of transitions from 'not-entitled' to 'entitled' and from 'entitled' to 'entitled.' Results show that the probability of transition from 'not-work' to 'work' increased noticeably between 1999 and 2000 but then stabilized at a lower level for all ages, 65 through 69. The probabilities of transition from 'not-entitled' to 'entitled' more than doubled between 1999 and 2000 for those aged 65-66. The transition probability from 'not-entitled' to 'entitled' also stabilized at a lower level after 2000. These numbers suggest that the 2000 removal of the earnings test had a clear impact on work and benefit claims among older workers.

The removal of the earnings test affects not only the decision to work and claim benefits but also hours of work or earnings through the counteracting income and substitution effects depending on workers' earnings relative to the earnings test threshold. If the earnings test removal increases earnings around the threshold level but decreases earnings above the upper threshold, analyses based on mean earnings only may not capture these important differences. In an effort to more closely examine the effects on earnings at different points along the distribution, we look at earnings at the 40th through 80th percentiles for those who work over the study period, by age groups (see Table 3). Results show gradual increases in earnings over the study period, measured either by the simple mean over the entire sample or by each decile of the earnings distribution, among the sample of working individuals. The gradual increases in earnings at the various deciles appear to accelerate slightly in 2000 for both treatment groups, which could indicate that earnings of the treatment groups are affected by the earnings test removal.[22]

[22] It is tempting to look at earnings of beneficiaries because the earnings test is applicable only to OASI beneficiaries. Since the pool of beneficiaries after the 2000 removal includes "new entrants" who are induced to claim benefits, results that examine work and earnings of beneficiaries before and after the earnings test removal are seriously flawed. Perhaps we could examine work and earnings of beneficiaries who had become entitled prior to turning 65. However, if benefit entitlement status for those who have not

Numbers on upwards earnings mobility by age indicate that the percentage of individuals with increased earnings over a two-year span is strictly greater in later years than in earlier years (see Figure 3a). Between 1999 and 2000, the probabilities of observing increased earnings for workers aged 65-69 rose by approximately 2 percentage points relative to earlier years, for all ages from 65 through 69. Individuals with increased earnings can be decomposed into 1) those whose earnings rose from zero to a positive amount, and 2) those who had positive earnings followed by even larger earnings. The first component of earnings mobility is equivalent to transitions in work participation from no work to work. Figure 3b shows the second component of earnings mobility. Results indicate that approximately half of the workers with increased earnings between 1999 and 2000 transition from not work to work (an increase in work participation) and the rest is due to increased earnings among those who were already working. This result is more powerful than results based on pooled cross-sectional data because it comes from comparing earnings of the same individual over two consecutive years.[23]

V. Regression Analysis

Theoretical predictions that the removal of the earnings test would cause increases in retirement benefit claims, work participation, and earnings unevenly over the earnings distribution receive some support from the descriptive analysis above. This section presents reduced form regression estimates of the effects on work participation and benefit entitlement using a Probit specification, and of the effect on the earnings distribution using OLS, truncated, and percentile regressions.

The regression estimates are based on the following difference-in-difference model,

$$y_{it}^{j} = a + g\Delta_t + h\Delta^j + \beta\Delta_t^j + c'X_i + e_{it}^j ,$$

reached 65 has been affected by the removal, these results are also flawed. Similarly, results that examine benefit entitlements by current work status or earning levels are also flawed.

[23] One can argue that the post 9/11 stock market crash may have caused some older workers to work more hours. The argument could be relevant in our analyses if ratios of stocks to financial assets among those 65-69 are significantly different from those of the control groups. However, we find no such evidence in tabulations using the Survey of Consumer Finances (Poterba (2004)).

where X is a vector of the individual's characteristics; Δs are dummy variables; index $j = 1$ for the treatment groups, either those turning 65 or those who have attained ages 65-69; index $j = 0$ for the control groups, those turning 62-64 and those who have attained 70-72; time index t = 1996, 1997, …, 2003.[24] Thus, effects of the earnings test removal are identified by the βs which are the coefficients of year-specific, post-treatment dummies. Since effects immediately after the removal may differ from later effects, we include yearly treatment dummies rather than just one treatment dummy to cover the whole post-removal period. The dependent variable (y) is either benefit-entitlement status, work-participation status, or observed annual earnings.

Choosing the specification for evaluating effects on benefit entitlement and work participation is straightforward because observed outcomes are binary, discrete variables. We use a Probit specification for both binary outcome variables. Because the earnings of a large fraction of the samples are zero, we need to account for the difference between the censored zero observations and the continuous non-zero observations in estimating the effects on earnings.[25] Although the Tobit ("Type I") regression method is a simple and popular way to account for the difference, it appears to be problematic in our context because earnings cannot take on negative values (Hausman and Wise (1977), Maddala (2001)). Thus, we use the truncated regression method to examine average effects over individuals with earnings.[26] Neither truncated regression nor OLS-based estimates are appropriate to capture the uneven impact over the distribution that is predicted by theory.

[24] Hence $\Delta_{1996} = 1$ if $t = 1996$ and 0 otherwise; $\Delta^j = 1$ if $j = 1$ and 0 otherwise; and $\Delta^j_{2000} = 1$ if $t = 2000$ and $j = 1$, and 0 otherwise.

[25] While the OLS approach can be useful in measuring the mean effect over the whole sample, it suffers from the failure to distinguish between censored and noncensored values of earnings. Further, when the dependent variable is censored, OLS estimates over all samples tend to be biased toward zero (Amemiya (1985)).

[26] We acknowledge that the truncated regression method is also problematic because we are ignoring information in the independent variables for those zero earners. An appropriate approach would be a general Tobit ("Type II") that accounts for the two-step labor supply decision process that generates observed zero and non-zero earnings (Amemiya (1985)). However, one needs to model the work decision separately from the work-hours (or earnings) decision. Further, two conditions must hold: 1) the covariance term of the work-participation equation and the earnings-level equation must be zero; 2) at least one variable in the earnings equation is not included in the work-participation equation (Maddala (1983)). It is not feasible for us to use the general Tobit specification because the SSA administrative data contain limited information on individuals' characteristics. Therefore, caution is necessary in interpreting truncated regression results and using the estimate for other purposes.

Thus, we use percentile regression methods, where we limit the sample to working individuals (non-zero earners).

The difference-in-difference model presented above relies on two critical assumptions: 1) no contemporaneous shock other than the 2000 earnings test removal has affected the dependent variable of the treatment groups relative to the control groups; 2) any change in the dependent variable in the absence of the treatment is the same for all groups. Thus, we offer a simple specification test to see whether the estimate of β is zero in the absence of changes in the earnings test. In other words, if β does identify the effects of the earnings test removal, coefficients of Δ^j_{1996}, Δ^j_{1997}, Δ^j_{1998}, and Δ^j_{1999} ('false treatment dummies') would each equal zero. To show that our model captures the causal effect, we present estimates from the model, including year-specific, pre- and post-treatment dummies (Δ^j_{1997}, Δ^j_{1998}, Δ^j_{1999}, Δ^j_{2000}, Δ^j_{2001}, Δ^j_{2002}, and Δ^j_{2003}); a second specification includes year-specific, post-treatment dummies ('true treatment dummies').[27]

A. Estimated effects on benefit entitlement

To estimate effects of the earnings test removal on benefit claims, we use the reduced form, difference-in-difference Probit model described above (see Table 4). We report results from two separate regressions, one for each treatment group. Results in the top panel show estimated effects on those individuals who have attained ages 65-69 and the bottom panel, those who are turning 65. Model I includes the full set of interaction dummies from 1997 through 2003 for specification test purposes, and Model II includes interaction dummies for the post-removal period. We consider Model II to be our base model, and marginal effects on the base model are also included in the table. To show how estimates vary by the choice of control group, we report separate estimates from models that include either only the younger control group (Model III) or only the older control group (Model IV).

[27] Here Δ^j_{1996} is the omitted interaction dummy. See Angrist and Krueger (1999) for further discussion on the specification test for the difference-in-difference model.

Results from our base model (II) show that estimated coefficients of β for all four years are large and statistically significant, which suggests that the earnings test removal in 2000 has increased benefit entitlements for both treatment groups. The effects tend to increase over the four years for the older treatment group, but they are relatively stable for the younger treatment group. Estimated marginal effects indicate that the benefit entitlement rate for the older treatment group increased approximately 2 to 5 percentage points after the test removal. It also increased approximately 3 to 7 percentage points for the younger group.

Results from the reduced form, difference-in-difference model are fragile without a model specification test. Results from Model I show that estimated coefficients of the false treatment dummies are all small and not statistically significant, indicating that in the absence of the treatment, changes in benefit entitlement rates are same for all groups. From Models I and II, we can easily calculate the likelihood test statistics for testing the model specification. The likelihood test statistic of the model for individuals who have attained 65-69 is 1.24 (3 d. f.); for those who turning 65 it is 3.46 (3 d. f.). Thus, we cannot reject the null hypothesis of $\beta_{1997} = \beta_{1998} = \beta_{1999} = 0$ at the 5 percent significance level, indicating that estimates from our base model do capture the effect of the earnings test removal.

The estimated effect of a 2.2 percentage point increase in benefit claims in 2000 following the test removal appears to be consistent with the result reported in Song (2003/2004). Finding accelerated benefit claims among individuals who reached age 65 should not be surprising. The estimated magnitude of 2 to 5 percentage points may not seem large. However, considering that nearly 90 percent of those who attained 65-69 were already entitled to Old Age benefits before 2000, the estimates indicate a substantially large impact on benefit claims among those who had not yet become beneficiaries by age 65.

Although the base model (II) is preferable to the models that include either the younger control group only (III) or the older control group only (IV), Models III and IV provide additional insights into the reliability of estimates from the base model. One expects that estimates from Models III and IV may be dissimilar because the groups display vast differences in labor market status and benefit entitlements. Further, it has been argued that the elimination of the earning test for individuals who have attained ages 65-69 could have spillover effects on benefit-claiming behavior for those younger than 65 (Gruber and Orszag, 2000).[28] That is, if such spillover exists, using those who are turning 62-64 as the only control group might cause an over-estimation of the effect. Likewise, using those who have attained 70-72 as the only control group might cause the effect to be underestimated, because any causal effect on the benefit entitlement of those who have attained 65-69 will eventually affect the benefit entitlement of those who have attained 70-72. The magnitude of the underestimation is likely to increase over time because all observations in the current treatment group will eventually enter the control group (those who have attained 70-72).

Results from Models III and IV are consistent with these speculations. First, the estimated effects from Model III are all larger than those from Model IV. While estimates from Model III can be considered to be upper-bound estimates, those from Model IV can be considered to be lower-bound estimates. It is interesting that the differences between the estimates from Models II and IV were relatively small in 2000 and that the differences in magnitude grow over time. We can speculate that it takes time to propagate the spillover effects, if any, to the 62-64 or 70-72 age groups. If so, estimates of the effects for the year immediately following the test removal may represent the true short-term effects, while the estimates from later years presumably represent the true long-term effects.

[28] An individual aged 62-64 who wants to claim benefits may decide to continue working until reaching age 65 rather than to reduce work (or to retire). Similarly, an individual aged 62-64 who works above the earnings test threshold, may decide not to claim benefits until reaching age 65. Both types of spill over are likely to occur because of the labor market rigidities. Because of older workers' declining health and outdated skill levels, reentry into the labor market would be quite limited for them.

B. Estimated effects on work participation

Our estimated effects of the removal of the earnings test on work participation also come from a reduced form difference-in-difference Probit model (see Table 5). We again present estimates from four models for each treatment group, as we did in estimating effects on benefit entitlement. Estimates in the top panel of the Table indicate the effects on individuals who attained 65-69 and the lower panel shows effects on those turning 65. Results from Model II (base model) results show that the estimated coefficients for all four treatment dummies are statistically significant for those attained 65-69, but are not for those turning 65. Estimated marginal effects indicate that the work-participation rate among individuals who attained 65-69 has increased by 0.8 to 2 percentage points following the 2000 earnings test removal. Results further show that these effects increased over the study period.

We calculate the likelihood test statistics for the model specification from Model I and Model II. The statistics of the model for individuals who reached ages 65-69 is 8.2 (3 d. f.) and, for those turning 65 is 0.94 (3 d. f.), indicating that we are only marginally rejecting the null hypothesis of $\beta_{1997} = \beta_{1998} = \beta_{1999} = 0$ at a 5 percent significance level for those who have attained ages 65-69. That is, estimates of β s for those aged 65-69 may be capturing effects other than the pure causal effect. Estimates from Model I show a gradual increase in the magnitude of estimates for treatment dummies over our study period, which suggests that a group-specific time trend, independent of the earnings test removal, may contaminate these estimates. If this gradually increasing time trend is not controlled in the model, we could overestimate the true effects of the test removal. However, we expect the bias to be small.

Finding a gradual increase in the effect of removing the earnings test on work participation is not surprising for several reasons. Returning to the labor market may require a difficult and costly job search for those aged 65-69. Thus, estimated effects immediately following the removal are probably downward biased. However, additional years of job search may not significantly affect the work participation of these older workers, because their declining health and outdated skill levels constrain their labor market choices. If this is true, then the increasing effects over time can result from the gradual increase in the number of older workers remaining in the labor market, not from older workers returning to the labor market. Note that the individuals aged 65-69 in 2000 are not the same cohort as those aged 65-69 in 2001, 2002, and so on. The gradual increase in work participation may have affected the work participation of those aged 70-72 as well. If work participation in this older group is affected with a lag by the removal of the 2000 earnings test, estimated effects using those aged 70-72 as the only control group may underestimate the true causal effects. One can also speculate on a spillover effect to a younger age group. If labor market rigidities limit entry into and exit out of the labor force, we expect to see a positive spillover effect on those turning 62-64. However, estimates from Model III contradict this speculation, because the estimates are larger than those from the base model. It seems plausible that the difference in estimates from Models III and IV is not caused by the spillover effect but rather by age-group-specific time trends.

C. Estimated effects on earnings

We estimate the reduced form, difference-in-difference equation using the following specifications: truncated regression, OLS over samples with non-zero earnings, and percentile regressions over samples with non-zero earnings. Estimates from the truncated regression specification of the difference-in-difference model show that estimated coefficients of effects for individuals who have attained ages 65-69 are large and statistically significant in the base model (Model II). Since the dependent variable is the logarithm of earnings, coefficients of treatment dummies indicate percentage change in earnings after the 2000 removal. Earnings increase approximately 4 to 10 percent per year among working individuals (see Table 6). Effects in 2000 appear to be much smaller than effects in 2001-2003. The result for those who have attained 65-69 seems plausible because the law was enacted in April 2000 and older people needed time to respond. Effects on earnings for individuals turning 65 are also found here; estimates for 2000-2003 are 6.5 percent , 5.3 percent, 6.4 percent, and 7.5 percent, respectively.

Estimates of false treatment dummies (Model I) for those who have attained ages 65-69 are not only statistically insignificant but also small in magnitude. It is particularly notable that the magnitude of the estimates jumps from 1999 to 2000. The likelihood ratio test statistics indicate that our specification of the model appropriately captures the effect of removing the earnings test for both experimental groups. The likelihood ratio statistics for those who have attained 65-69 is 0.6 (3 d.f.) and, for those reaching 65, is 2.4 (3 d.f.). Such results indicate that we cannot reject the null hypothesis $\beta_{1997} = \beta_{1998} = \beta_{1999} = 0$ at a 5 percent significance level in both models.[29] Again, estimated effects either from Model III or from Model IV are comparable to those from the base model.

Estimates from a semi-log specification of the difference-in-difference percentile regression over samples with non-zero earnings can be interpreted as the percentage change in earnings at specific points along the earnings distribution after the test removal (see Table 7). For individuals who have attained ages 65-69, statistical significance at the 5 percent level is found at the 50th-80th percentiles of the log of earnings in 2000, the 30th-80th percentiles in 2001, the 10th-80th percentiles in 2002, and the 20th-80th percentiles in 2003. Results in the bottom panel indicate significance in the 30th-70th percentiles of the log of earnings for those turning 65. While statistically significant effects are found in almost the entire distribution (particularly for the younger treatment group), the magnitude of these effects appears to be the largest at the 70th percentile (8 to 23 percent) for the older treatment group and the 50th percentile (13 to 17 percent) for the younger treatment group. Estimates of 'false treatment' dummies are close to zero, indicating that our specification appropriately captures the effects of the test removal.[30] Estimated effects on the lower percentiles for those turning age 65 appear to be large. But the standard errors for these estimates are fairly large, so they are not statistically significant.

[29] As is true for the estimates for benefit claims and work participation, we found similar results if one or the other of the control groups is used.

[30] Calculated Wald test statistics show that our specification is appropriate to capture the effect of removal on earnings in most of percentiles, except the 60th percentile of those 65-69, and the 10th and the 30th percentiles of those turning 65. Wald statistics for each decile regressions from the 10th to the 90th for those who have attained 65-69 are 0.26, 7.4, 0.34, 4.21, 1.35, 10.22, 8.46, 0.74, and 3.21, respectively. The equivalent statistic for the OLS specification is 1.01.

It is notable that estimates for the 90th percentile are small and sometimes negative with large standard errors, suggesting the presence of income effects. Estimated effects based on the OLS regression reported in the last column of Table 7 show significant effects in all four years following the removal.

While the semi-log specification is useful in obtaining estimates of percentage changes in earnings, of interest here is the change in actual earnings. Thus, we estimate the models using earnings in $000 as the dependent variable rather than the log of earnings (see Table 8). Unlike estimates in the semi-log specification, estimates based on OLS are small and not significant at the 10 percent level, indicating that the mean earnings of those who have attained 65-69 were not affected by the earnings test removal. However, the removal has increased earnings for individuals who have attained ages 65-69 at the 60th percentile in 2000, 60th-70th percentiles in 2001, 60th-80th percentiles in 2002, and 60th-80th percentiles of earnings in 2003 by statistically significant amounts (see Table 8, top panel). Since the rule was changed in April 2000 and effective retroactively from January 2000, relatively small effects in 2000 are not surprising. It is particularly notable that these percentiles correspond to the earnings test threshold. For those who have attained ages 65-69, the threshold in 1999 was $15,500, and earnings at the 60th percentile in 1999 through 2003 were $11,997, $12,750, $14,468, $15,508, and $16,737, respectively (see Table 3 for other percentile values). Thus, our results clearly indicate that the removal of the earnings test has affected the earnings distribution as predicted by economic theory.

For those turning 65, the estimates using OLS show no effects on earnings. However, results based on percentile regressions indicate that the test removal affects the 40th-80th percentiles of earnings in 2000, 50th-70th percentiles in 2001, 50th-70th percentiles in 2002, and 40th-70th percentiles in 2003. Yet again, those percentiles correspond to the earnings test threshold for those attaining age 65. The earnings test thresholds in 2000 through 2003 for those reaching 65 were $17,000, $25,000, $30,000, and $30,720, respectively. Earnings at the 70th percentile in 2000 through 2003 were $27,825, $28,564, $30,200, and $31,986, respectively (see Table 3 for other percentile values).

Again, small and sometimes negative estimates for the 90th percentile suggest the presence of income effects. The results indicate that earnings just around the test threshold are affected. A conventional mean-based evaluation fails to detect the effect of the earnings test removal on earnings. A significant effect on a relatively small fraction of the sample could be overlooked if we were to focus on mean effects only (Heckman, Smith, and Clements, 1997). But by analyzing the effects over different percentiles of the earnings distribution, this study finds statistically significant effects of the test removal in a way that is exactly predicted by economic theory.

Lastly, we estimate the percentile regressions by including interaction dummies for 1997 through 2003 and plot point estimates of these effects by year and percentile (see Figure 4 for logged earnings and Figure 5 for earnings in $000). The figures show 1) how the earnings distributions of the treatment groups have evolved since 1996 after controlling both time and group effects; and 2) that the earnings distributions of the treatment groups during the post-removal period have not changed significantly from those of 1996, thereby lending support to the specification of our model. In both semi-log and level specifications for those who have attained ages 65-69, earnings at the 60th through 80th percentiles of the distributions during the post-removal period clearly contrast with those of the pre-removal period. Similarly, earnings at the 50th through 70th percentiles of the distributions are clearly affected by the test removal for those turning 65. More importantly, estimates for the false treatment dummies (1997 through 1999) are located near the horizontal axis. If our estimates capture effects caused by factors other than the earnings test removal, we would not expect to see the observed pattern of changes in the earnings distributions of the treatment groups.

VI. Concluding Remarks

This paper evaluates responses to the 2000 Social Security program change by examining annual earnings and retirement-benefit claim records that cover the four years subsequent to the change. We use the one-percent sample of longitudinal data on earnings (capped and uncapped) and Old Age, Survivors, and Disability Insurance (OASDI) benefit entitlements. The data sample is large and contains the most accurate annual earnings records that are free from the self-reporting problems common in survey-based records.

Three findings emerge from the study. First, the effect on earnings of removing the earnings test is uneven over the distribution of individuals' earnings. While the effect on earnings in the lower percentiles is not statistically significant, the effect on earnings in the higher percentiles (50^{th} to 80^{th} percentiles) is large and significant. Such a finding indicates that effects of the removal are limited to earnings levels above the test threshold. The largest increases in earnings are found in the 70^{th} percentile, \$180 to \$1,670 for those who have attained ages 65-69 and the 60^{th} percentile, \$1,500 to \$2,800 for those turning 65. Second, there is no clear evidence of the effect of the test removal on the labor force participation rate among individuals reaching age 65, whereas work participation among individuals aged 65-69 increased between 1 and 2 percentage points after the removal. That effect appears to increase over the post-removal period, suggesting that labor market rigidities prevent some workers from responding immediately. Third, following the removal of the earnings test, applications for benefits accelerated by 2 to 5 percentage points among individuals aged 65-69 and by 3 to 7 percentage points among those reaching age 65.

The results shown in this paper apply specifically to a change in the retirement earnings test, but the response to changes in thresholds may generalize to other policies. For example, the amount that Disability Insurance beneficiaries can earn without losing benefits, known as the Substantial Gainful Activity limit, or SGA, increased from \$500 per month during the 1990s to \$700 per month (indexed to average wage growth) beginning in July 1999. We might expect to find increased earnings among those close to the threshold after the increase in SGA, just as we found increased earnings among those close to the earnings test threshold for whom the earnings test was relaxed or eliminated.

We have several ideas for future research. First, we would like to explore the work activities and claiming behavior of women separately from men in response to the removal of the earnings test. Second, the behavior of high-income beneficiaries in response to the removal of the earnings test might be worth further exploration. Those workers received a windfall when the earnings test was eliminated, but it appears from our results that they did not change their earnings or the timing of benefit claiming much. Such a result could be caused by small sample sizes in the top end of the earnings distribution of high-income workers or it might be the result of some as yet unexplored factors. Third, policymakers are interested in the net programmatic cost or gain to the Social Security system that arises from three sources: the loss of revenue following the elimination of the earnings test, higher payroll taxes coming from older workers who earn more, and accelerated benefit claims. Estimating both an annual cost and a long-term cost would be informative.

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Table 1: Sample size, by birth and calendar years

		Calendar Year								
		1996	***1997***	***1998***	***1999***	***2000***	***2001***	***2002***	***2003***	
	1923	12,219								
	1924	13,325	12,919							
	1925	13,151	12,796	12,395						
	1926	13,552	13,196	12,820	12,437					
	1927	14,184	13,849	13,465	13,083	12,668				
	1928	14,431	14,091	13,750	13,393	13,018	12,619			
	1929	14,435	14,130	13,841	13,522	13,154	12,762	12,373		
	1930	15,228	14,970	14,681	14,350	14,010	13,651	13,255	12,826	
Birth	***1931***	14,419	14,221	13,988	13,760	13,506	13,235	12,929	12,609	Group4
Year	***1932***	14,414	14,258	14,102	13,920	13,702	13,443	13,174	12,913	
	1933	14,324	14,187	14,036	13,881	13,697	13,484	13,268	13,045	
	1934	14,804	14,675	14,530	14,367	14,169	13,961	13,748	13,521	
	1935		15,289	15,161	15,014	14,853	14,685	14,493	14,297	Group3
	1936			15,529	15,383	15,240	15,071	14,897	14,707	
	1937				15,933	15,798	15,648	15,493	15,329	
	1938					16,786	16,662	16,515	16,370	Group2
	1939						16,763	16,653	16,511	
	1940							17,811	17,671	Group1
	1941								18,418	
	Total	168,486	168,581	168,298	169,043	170,601	171,984	174,609	178,217	1,369,819

Source: Authors' tabulation using the 1 percent extract of SSA MEF and MBR files.

Note: Group1: turning ages 62-64 during the year
Group2: turning age 65 during the year
Group3: have attained ages 65-69 by January 1st of each year
Group4: have attained ages 70-72 by January 1st of each year

Table 2: Work participation and benefit entitlement status, by age groups

	1996		1997		1998		1999		2000		2001		2002		2003	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Group1, turning 62-64																
Total sample	43,542	100.00	44,151	100.00	45,220	100.00	46,330	100.00	47,824	100.00	49,073	100.00	50,979	100.00	52,600	100.00
Total working sample	22,784	52.33	23,588	53.43	24,412	53.98	25,324	54.66	26,623	55.67	27,348	55.73	28,235	55.39	29,128	55.38
Beneficiaries (already entitled on 1/1)	9,258	21.26	9,331	21.13	9,421	20.83	9,745	21.03	10,058	21.03	9,766	19.90	10,040	19.69	9,988	18.99
Working beneficiaries	4,649	10.68	4,689	10.62	4,842	10.71	4,852	10.47	5,194	10.86	5,221	10.64	5,042	9.89	5,037	9.58
Beneficiaries (become entitled during year)	14,768	33.92	14,596	33.06	14,880	32.91	14,952	32.27	15,226	31.84	15,719	32.03	15,703	30.80	15,601	29.66
Working beneficiaries	4,810	11.05	4,880	11.05	4,948	10.94	5,217	11.26	5,295	11.07	5,148	10.49	5,200	10.20	5,098	9.69
Group2, turning 65																
Total sample	14,419	100.00	14,258	100.00	14,036	100.00	14,367	100.00	14,853	100.00	15,071	100.00	15,493	100.00	16,370	100.00
Total working sample	5,843	40.52	5,988	42.00	6,026	42.93	6,253	43.52	6,661	44.85	6,795	45.09	6,992	45.13	7,327	44.76
Beneficiaries (already entitled on 1/1)	9,352	64.86	9,172	64.33	8,807	62.75	9,070	63.13	9,219	62.07	9,295	61.67	9,520	61.45	9,877	60.34
Working beneficiaries	2,631	18.25	2,773	19.45	2,634	18.77	2,834	19.73	2,892	19.47	2,952	19.59	3,008	19.42	2,954	18.05
Beneficiaries (become entitled during year)	2,989	20.73	2,977	20.88	3,076	21.92	3,179	22.13	4,113	27.69	4,159	27.60	4,244	27.39	4,099	25.04
Working beneficiaries	2,167	15.03	2,189	15.35	2,252	16.04	2,307	16.06	3,122	21.02	3,161	20.97	3,235	20.88	3,071	18.76
Group3, have attained ages 65-69																
Total sample	71,830	100.00	71,261	100.00	70,362	100.00	69,433	100.00	69,084	100.00	68,808	100.00	69,580	100.00	70,899	100.00
Total working sample	18,890	26.30	19,432	27.27	19,926	28.32	20,290	29.22	21,221	30.72	21,628	31.43	22,163	31.85	22,752	32.09
Beneficiaries (already entitled on 1/1)	63,680	88.65	63,070	88.51	62,033	88.16	61,051	87.93	60,772	87.97	62,143	90.31	62,907	90.41	64,058	90.35
Working beneficiaries	16,021	22.30	16,466	23.11	16,904	24.02	17,133	24.68	18,032	26.10	19,630	28.53	20,144	28.95	20,626	29.09
Beneficiaries (become entitled during year)	810	1.13	776	1.09	838	1.19	1,005	1.45	1,838	2.66	475	0.69	395	0.57	588	0.83
Working beneficiaries	548	0.76	549	0.77	599	0.85	717	1.03	1,399	2.03	272	0.40	228	0.33	331	0.47
Group4, attained 70-72																
Total sample	38,695	100.00	38,911	100.00	38,680	100.00	38,913	100.00	38,840	100.00	39,032	100.00	38,557	100.00	38,348	100.00
Total working sample	6,109	15.79	6,401	16.45	6,643	17.17	6,847	17.60	7,328	18.87	7,366	18.87	7,509	19.48	7,502	19.56
Beneficiaries (already entitled on 1/1)	35,308	91.25	35,685	91.71	35,542	91.89	35,777	91.94	35,745	92.03	35,804	91.73	35,420	91.86	35,216	91.83
Working beneficiaries	5,574	14.40	5,926	15.23	6,181	15.98	6,382	16.40	6,850	17.64	6,850	17.55	7,018	18.20	7,036	18.35
Beneficiaries (become entitled during year)	240	0.62	90	0.23	50	0.13	40	0.10	48	0.12	33	0.08	46	0.12	49	0.13
Working beneficiaries	74	0.19	36	0.09	25	0.06	22	0.06	29	0.07	17	0.04	25	0.06	23	0.06

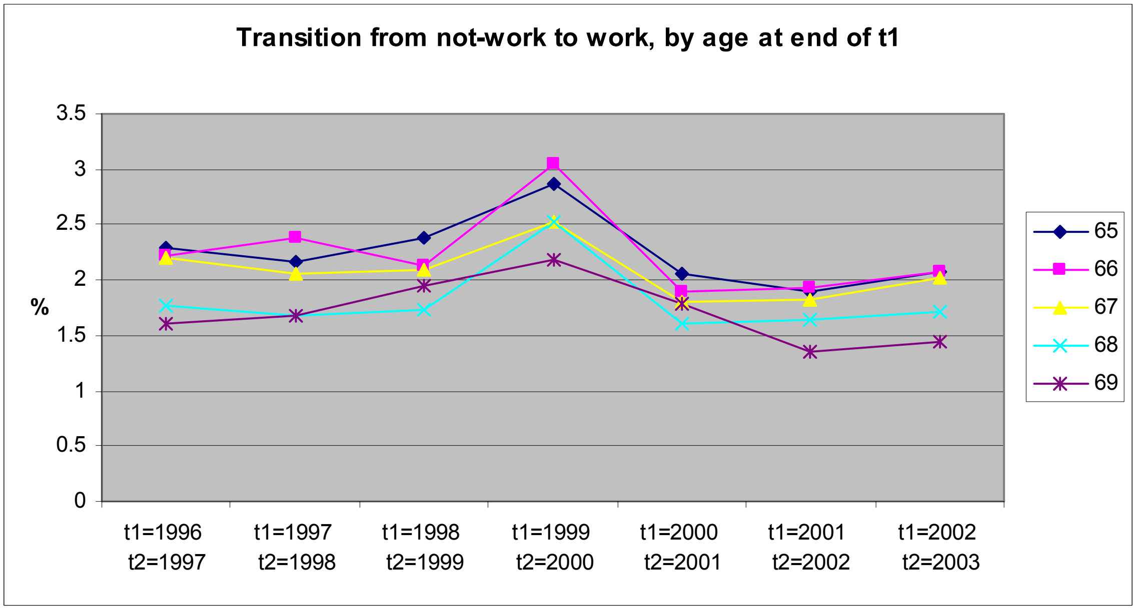
Source: Authors' tabulations using the 1 percent extract of SSA Master Earnings File and Master Beneficiary Record.
Sample Universe: living non-SSDI beneficiaries who are fully insured in the year they turn 62.

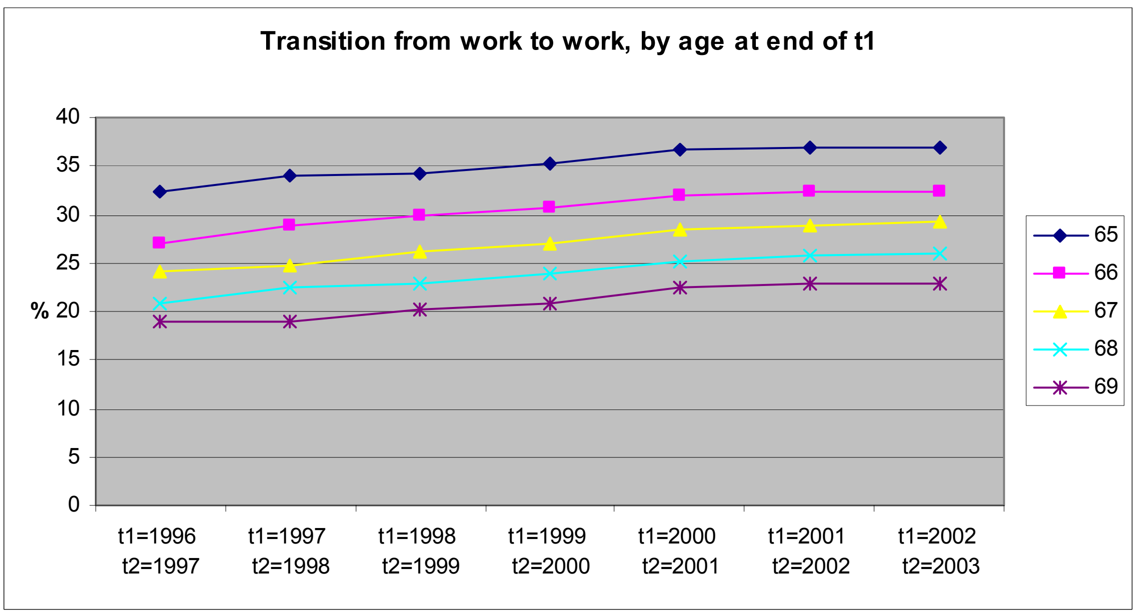
Table 3: Mean earnings, by age groups, 1996-2003

		1996	1997	1998	1999	2000	2001	2002	2003
Group1, turning 62-64									
All	N	43,542	44,151	45,220	46,330	47,824	49,073	50,979	52,600
	Mean	14,596	15,715	17,196	17,207	18,173	19,094	19,825	20,263
Working	N	22,784	23,588	24,412	25,324	26,623	27,348	28,235	29,128
	Mean	27,893	29,414	31,853	31,480	32,644	34,262	35,795	36,591
	40%	10,866	11,578	12,444	13,096	13,571	14,885	15,642	16,476
	50%	16,471	17,214	18,282	19,063	19,679	21,002	21,825	22,936
	60%	22,366	23,381	24,583	25,300	25,934	27,418	28,337	29,789
	70%	28,893	30,177	31,502	32,504	33,488	35,169	36,350	38,083
	80%	38,453	40,167	41,765	43,146	44,942	46,360	48,000	50,094
Group2, turning 65									
All	N	14,419	14,258	14,036	14,367	14,853	15,071	15,493	16,370
	Mean	10,707	10,134	11,046	13,028	12,426	12,973	13,509	14,849
Working	N	5,843	5,988	6,026	6,253	6,661	6,795	6,992	7,327
	Mean	26,421	24,130	25,728	29,932	27,707	28,773	29,935	33,175
	40%	7,800	8,174	9,000	9,138	10,263	10,850	11,618	12,285
	50%	10,562	11,196	12,479	12,313	14,609	15,300	16,606	17,200
	60%	14,494	15,149	16,972	16,214	19,931	21,330	22,747	23,894
	70%	22,185	23,008	24,651	23,918	27,825	28,564	30,200	31,986
	80%	32,206	33,065	35,825	35,247	38,596	39,082	41,564	44,174
Group3, have attained ages 65-69									
All	N	71,830	71,261	70,362	69,433	69,084	68,808	69,580	70,899
	Mean	4,843	5,543	5,785	5,869	6,741	7,480	7,602	8,223
Working	N	18,890	19,432	19,926	20,290	21,221	21,628	22,163	22,752
	Mean	18,418	20,326	20,427	20,084	21,946	23,798	23,866	25,625
	40%	5,754	5,888	6,264	6,639	6,984	7,875	8,304	8,787
	50%	7,884	8,207	8,586	9,111	9,600	10,791	11,497	12,250
	60%	10,400	10,912	11,359	11,997	12,750	14,468	15,508	16,737
	70%	12,766	13,551	14,437	15,394	17,000	19,602	21,337	23,120
	80%	21,549	22,208	22,632	23,652	25,354	28,824	30,882	33,023
Group4, have attained ages 70-72									
All	N	38,695	38,911	38,680	38,913	38,840	39,032	38,557	38,348
	Mean	2,376	2,657	3,029	3,107	3,275	3,288	3,394	3,658
Working	N	6,109	6,401	6,643	6,847	7,328	7,366	7,509	7,502
	Mean	15,049	16,149	17,638	17,657	17,356	17,421	17,426	18,700
	40%	4,348	4,784	4,945	5,180	5,083	5,685	5,678	6,181
	50%	6,341	6,632	7,008	7,193	7,259	7,934	8,064	8,757
	60%	8,795	9,114	9,522	9,722	9,850	10,617	10,968	11,641
	70%	11,566	12,000	12,364	13,000	13,278	14,400	14,597	15,717
	80%	16,546	16,900	17,517	18,200	18,332	20,182	20,774	22,431

Source: Authors' tabulations using the 1 percent extract of SSA MEF and MBR files. Earnings are in current dollars.

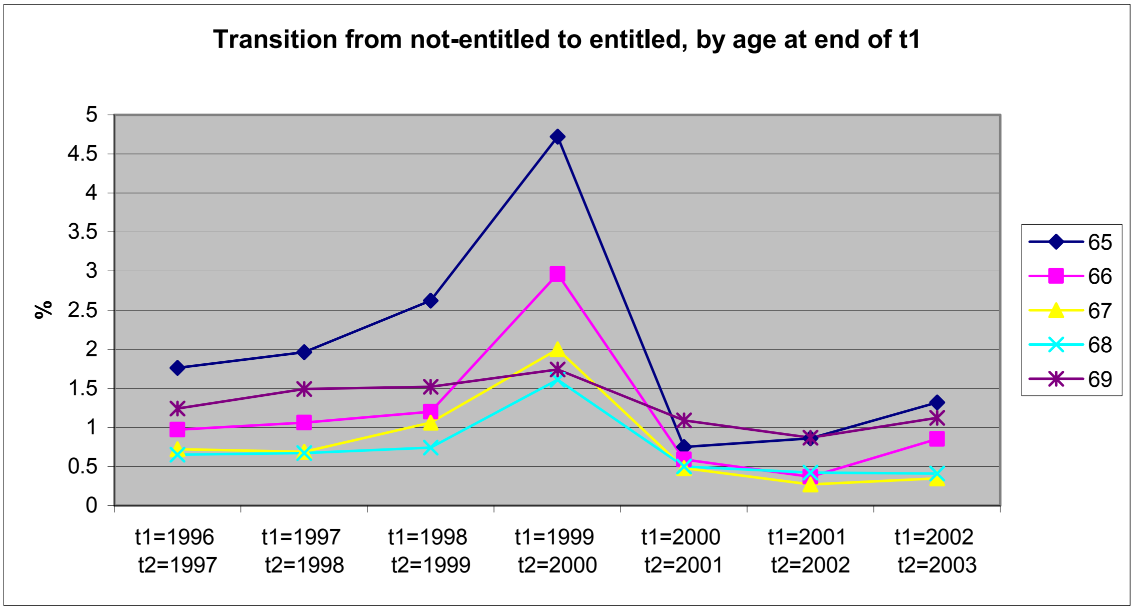
Figure 1: Transitions in work participation

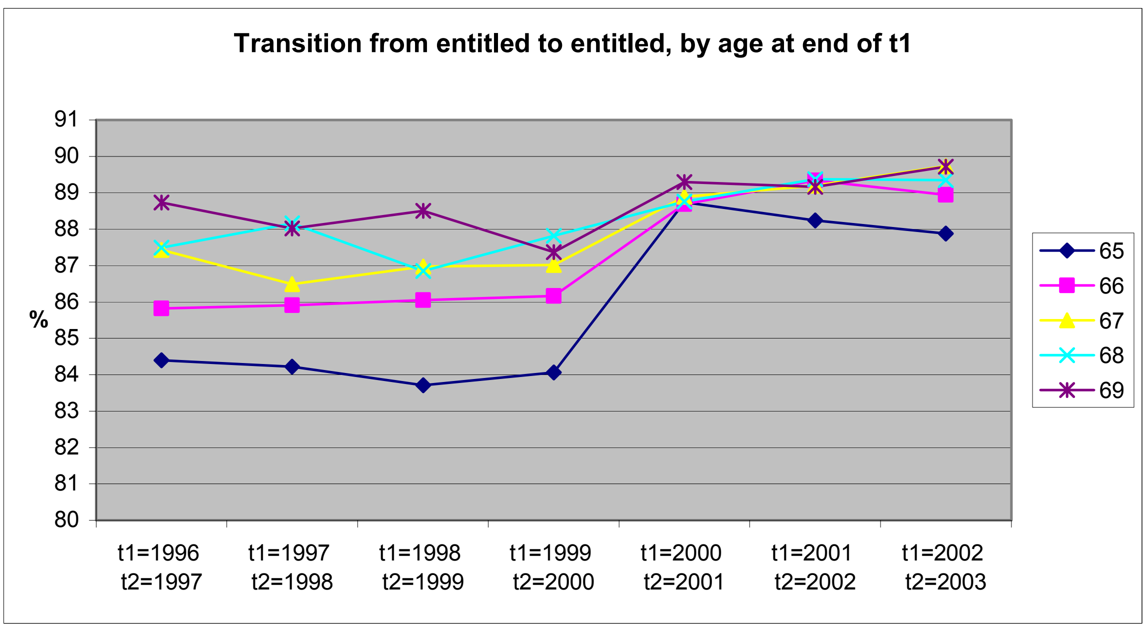




Source: Authors' tabulations using the 1 percent extract of SSA MEF and MBR files.

Figure 2: Transitions in benefit entitlement





Source: Authors' tabulations using the 1 percent extract of SSA MEF and MBR files.

Figure 3a: Earnings mobility, earnings at t1 $\geq$ 0

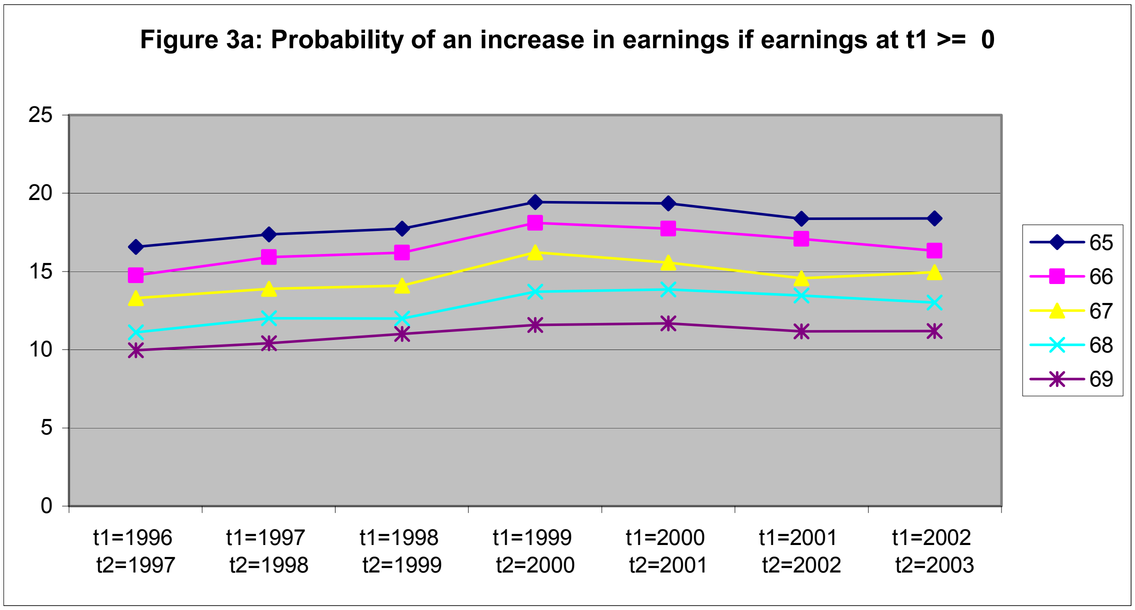
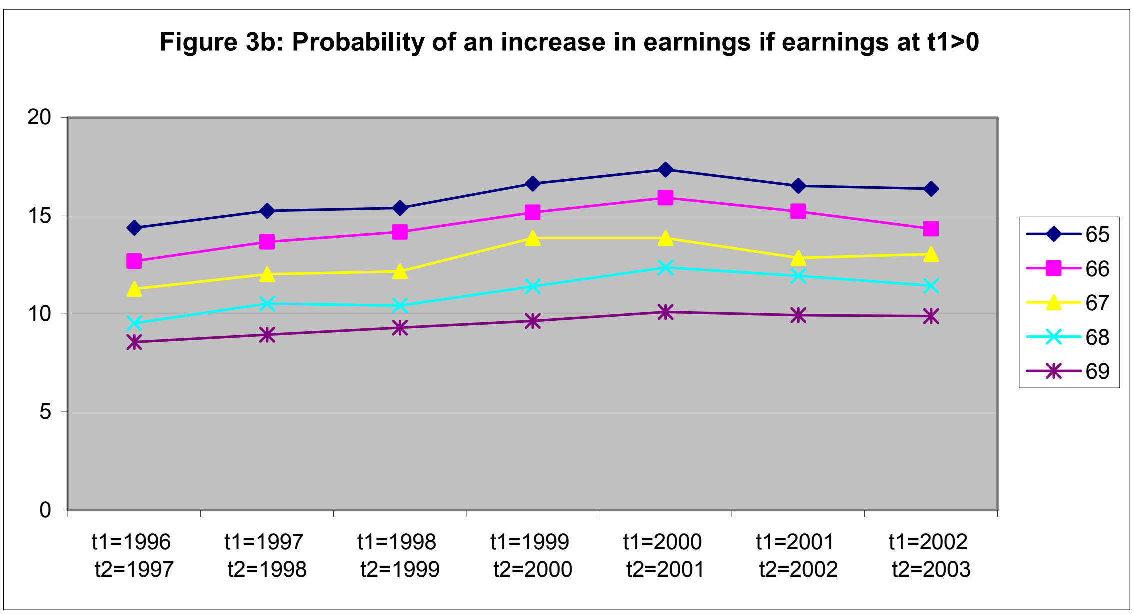


Figure 3b: Earnings mobility, earning at t1 $>$ 0



Source: Authors' tabulations using the 1 percent extract of SSA MEF and MBR files. Earnings are in current dollars.

Table 4: Pooled Probit estimates of effects on benefit entitlement

	(I)		(II)		Marginal Effects		(III)		(IV)	
Variable	Estimate	Std E	Estimate	Std E	dF/dx	Std E	Estimate	Std E	Estimate	Std E
Effects on those attained 65-69										
Treatment dummy, 1997	0.0076	0.0116	-	-	-	-	-	-	-	-
Treatment dummy, 1998	0.0029	0.0116	-	-	-	-	-	-	-	-
Treatment dummy, 1999	0.0120	0.0116	-	-	-	-	-	-	-	-
Treatment dummy, 2000	0.0936	0.0117	0.0880	0.0093	0.0219	0.0023	0.0986	0.0099	0.0656	0.0133
Treatment dummy, 2001	0.1396	0.0118	0.1340	0.0093	0.0333	0.0023	0.1449	0.0099	0.1109	0.0132
Treatment dummy, 2002	0.1610	0.0117	0.1553	0.0093	0.0386	0.0023	0.1787	0.0098	0.0951	0.0133
Treatment dummy, 2003	0.2076	0.0117	0.2020	0.0092	0.0502	0.0023	0.2368	0.0097	0.1070	0.0133
N		1,250,952		1,250,952				940,976		871,233
Log of likelihood		-518,157.04		-518,157.66				-436,402.95		-247,676.07
Effects on those turning 65										
Treatment dummy, 1997	0.0036	0.0197	-	-	-	-	-	-	-	-
Treatment dummy, 1998	-0.0173	0.0197	-	-	-	-	-	-	-	-
Treatment dummy, 1999	0.0189	0.0196	-	-	-	-	-	-		
Treatment dummy, 2000	0.2485	0.0204	0.2471	0.0165	0.0748	0.0050	0.2571	0.0167	0.2312	0.0192
Treatment dummy, 2001	0.2438	0.0202	0.2424	0.0162	0.0734	0.0049	0.2528	0.0164	0.2240	0.0189
Treatment dummy, 2002	0.2449	0.0199	0.2435	0.0159	0.0737	0.0048	0.2656	0.0161	0.1897	0.0187
Treatment dummy, 2003	0.1090	0.0191	0.1077	0.0147	0.0326	0.0045	0.1444	0.0150	0.0060	0.0177
N		808,562		808,562				498,586		428,843
Log of likelihood		-391,760.93		-391,762.66				-307996.8292		-124,504.34

Note: The dependent variable is old-age benefit entitlement status (1: entitled, 0: not entitled).
Other covariates included in the regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1996 through 2002.
Model I: two control groups, false treatment dummies; Model II: two control groups, only true treatment dummies;
Model III: younger control group (62-64), true treatment dummies; Model IV: older control group (70-72), true treatment dummies

Table 5: Pooled Probit estimates of effects on work participation

	(I)		(II)		Marginal effects		(III)		(IV)	
Variable	Estimate	Std E	Estimate	Std E	dF/dx	Std E	Estimate	Std E	Estimate	Std E
Effects on those who have attained 65-69										
Treatment dummy, 1997	0.0029	0.0097	-	-	-	-	-	-	-	-
Treatment dummy, 1998	0.0149	0.0097	-	-	-	-	-	-	-	-
Treatment dummy, 1999	0.0246	0.0097	-	-	-	-	-	-	-	-
Treatment dummy, 2000	0.0332	0.0097	0.0225	0.0076	0.0082	0.0027	0.0335	0.0086	0.0046	0.0100
Treatment dummy, 2001	0.0521	0.0096	0.0414	0.0075	0.0150	0.0027	0.0520	0.0085	0.0241	0.0100
Treatment dummy, 2002	0.0610	0.0096	0.0504	0.0075	0.0183	0.0027	0.0724	0.0084	0.0130	0.0099
Treatment dummy, 2003	0.0669	0.0095	0.0562	0.0074	0.0204	0.0027	0.0793	0.0083	0.0162	0.0099
N		1,250,952		1,250,952				940,976		871,233
Log of likelihood		-746,984.89		-746,988.99				-601,411.83		-485,697.76
Effects on those turning 65										
Treatment dummy, 1997	0.0110	0.0164	-	-	-	-	-	-	-	-
Treatment dummy, 1998	0.0142	0.0164	-	-	-	-	-	-	-	-
Treatment dummy, 1999	0.0129	0.0163	-	-	-	-	-	-	-	-
Treatment dummy, 2000	0.0108	0.0161	0.0013	0.0127	0.0005	0.0048	0.0125	0.0133	-0.0168	0.0142
Treatment dummy, 2001	0.0162	0.0161	0.0067	0.0126	0.0025	0.0048	0.0174	0.0132	-0.0108	0.0142
Treatment dummy, 2002	0.0155	0.0160	0.0059	0.0125	0.0023	0.0047	0.0281	0.0130	-0.0316	0.0141
Treatment dummy, 2003	0.0054	0.0158	-0.0041	0.0122	-0.0015	0.0046	0.0192	0.0128	-0.0443	0.0139
N		808,562		808,562				498,586		428,843
Log of likelihood		-488,129.76		-488,130.23				-342,543.26		-226,842.87

Note: The dependent variable is work participation status (1: work (earnings > 0), 0: not work (earnings=0)).

Other covariates included in the regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1996 through 2002.

Model I: two control groups, false treatment dummies; Model II: two control groups, only true treatment dummies;

Model III: younger control group (62-64), true treatment dummies; Model IV: older control group (70-72), true treatment dummies

Table 6: Pooled truncated regression estimates of effects on earnings

	(I)		(II)		(III)		(IV)	
Variable	Estimate	Std E	Estimate	Std E	Estimate	Std E	Estimate	Std E
Effects on those who have attained 65-69								
Treatment dummy, 1997	-0.0143	0.0220	-	-	-	-	-	-
Treatment dummy, 1998	-0.0128	0.0219	-	-	-	-	-	-
Treatment dummy, 1999	-0.0102	0.0217	-	-	-	-	-	-
Treatment dummy, 2000	0.0357	0.0215	0.0452	0.0166	0.0411	0.0172	0.0582	0.0272
Treatment dummy, 2001	0.0701	0.0214	0.0795	0.0164	0.0856	0.0170	0.0567	0.0271
Treatment dummy, 2002	0.0964	0.0213	0.1058	0.0163	0.1066	0.0168	0.1032	0.0269
Treatment dummy, 2003	0.0957	0.0211	0.1051	0.0161	0.1171	0.0167	0.0595	0.0268
N		429,449		429,445		373,744		222,007
Log of likelihood		-831,459.0		-831,459.3		-718,322.6		-442,343.9
Effects on those turning 65								
Treatment dummy, 1997	0.0384	0.0329	-	-	-	-	-	-
Treatment dummy, 1998	0.0495	0.0328	-	-	-	-	-	-
Treatment dummy, 1999	0.0286	0.0325	-	-	-	-	-	-
Treatment dummy, 2000	0.0946	0.0320	0.0652	0.0247	0.0602	0.0246	0.0804	0.0335
Treatment dummy, 2001	0.0819	0.0319	0.0525	0.0245	0.0581	0.0243	0.0303	0.0334
Treatment dummy, 2002	0.0938	0.0317	0.0644	0.0242	0.0652	0.0241	0.0611	0.0331
Treatment dummy, 2003	0.1040	0.0314	0.0746	0.0238	0.0867	0.0237	0.0278	0.0328
N		315,032		808,562		259,327		107,590
Log of likelihood		-601,195.8		-601,197.0		-487,526.2		-212,979.6

Note: The dependent variable is the logarithm of earnings.

Other covariates included in the regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1996 through 2002.

Model I: two control groups, false treatment dummies; Model II: two control groups, only true treatment dummies;

Model III: younger control group (62-64), true treatment dummies; Model IV: older control group (70-72), true treatment dummies

Table 7: Regression estimates of effects on earnings, logged earnings

	Percentile regression									OLS
	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	
Effects on those who have attained 65-69										
Constant	6.9810	8.0171	8.6125	8.9412	9.1255	9.3282	9.5680	9.9338	10.4283	8.8494
	(.0433)	(.0228)	(.0143)	(.0154)	(.0113)	(.0096)	(.01)	(.0127)	(.0144)	(.0137)
Treatment dummy, 2000	0.0950	0.0310	-0.0053	0.0155	0.0370	0.0671	0.0807	0.0331	-0.0138	0.0437
	(.054)	(.0274)	(.0201)	(.0182)	(.0156)	(.0131)	(.015)	(.0197)	(.0181)	(.0166)
Treatment dummy, 2001	0.0307	0.0387	0.0448	0.0476	0.0913	0.1313	0.1638	0.1001	0.0178	0.0771
	(.0602)	(.0324)	(.0193)	(.0189)	(.0127)	(.0133)	(.0143)	(.0187)	(.0167)	(.0165)
Treatment dummy, 2002	0.1348	0.0855	0.0608	0.0618	0.1071	0.1743	0.2020	0.1230	0.0280	0.1069
	(.0585)	(.0345)	(.0221)	(.0186)	(.0138)	(.0135)	(.0136)	(.0144)	(.0168)	(.0163)
Treatment dummy, 2003	0.0633	0.0998	0.0542	0.0532	0.1276	0.1990	0.2307	0.1475	0.0334	0.1057
	(.0483)	(.0358)	(.021)	(.0176)	(.0143)	(.014)	(.0122)	(.0165)	(.0184)	(.0162)
N: 429,449										
R-square	0.0365	0.0346	0.0360	0.0376	0.0491	0.0608	0.0621	0.0576	0.0562	0.0616
Effects on those turning 65										
Constant	7.5950	8.4709	9.0043	9.2388	9.3842	9.6651	9.9754	10.3039	10.6394	9.2157
	(.0489)	(.0287)	(.0192)	(.0162)	(.0137)	(.0133)	(.0152)	(.0147)	(.0144)	(.0164)
Treatment dummy, 2000	-0.0137	0.0569	0.0418	0.0837	0.1334	0.1015	0.0660	0.0306	0.0186	0.0674
	(.0876)	(.0563)	(.0278)	(.0278)	(.0239)	(.0224)	(.0203)	(.0202)	(.0231)	(.0248)
Treatment dummy, 2001	0.0934	0.0582	0.0107	0.0359	0.1220	0.1112	0.0526	-0.0089	-0.0067	0.0579
	(.0778)	(.0486)	(.0298)	(.0306)	(.0232)	(.0222)	(.0213)	(.0216)	(.0236)	(.0246)
Treatment dummy, 2002	0.0081	0.0635	0.0491	0.0642	0.1838	0.1565	0.0779	0.0055	0.0044	0.0669
	(.0759)	(.0477)	(.0282)	(.0297)	(.0217)	(.022)	(.0214)	(.02)	(.0214)	(.0243)
Treatment dummy, 2003	0.0545	0.0883	0.0468	0.0696	0.1686	0.1404	0.1069	0.0254	0.0176	0.0780
	(.0798)	(.0469)	(.0268)	(.0241)	(.0202)	(.023)	(.0193)	(.0207)	(.0196)	(.0239)
N: 315,032										
R-square	0.0366	0.0345	0.0355	0.0383	0.0500	0.0565	0.0583	0.0588	0.0595	0.0618

Note: The dependent variable is the log of current earnings. The samples include observations with non-zero earnings. Numbers in parentheses are standard errors. Standard errors are calculated by bootstrap resampling with 40 repetitions. Other covariates used in this regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1996 through 2002.

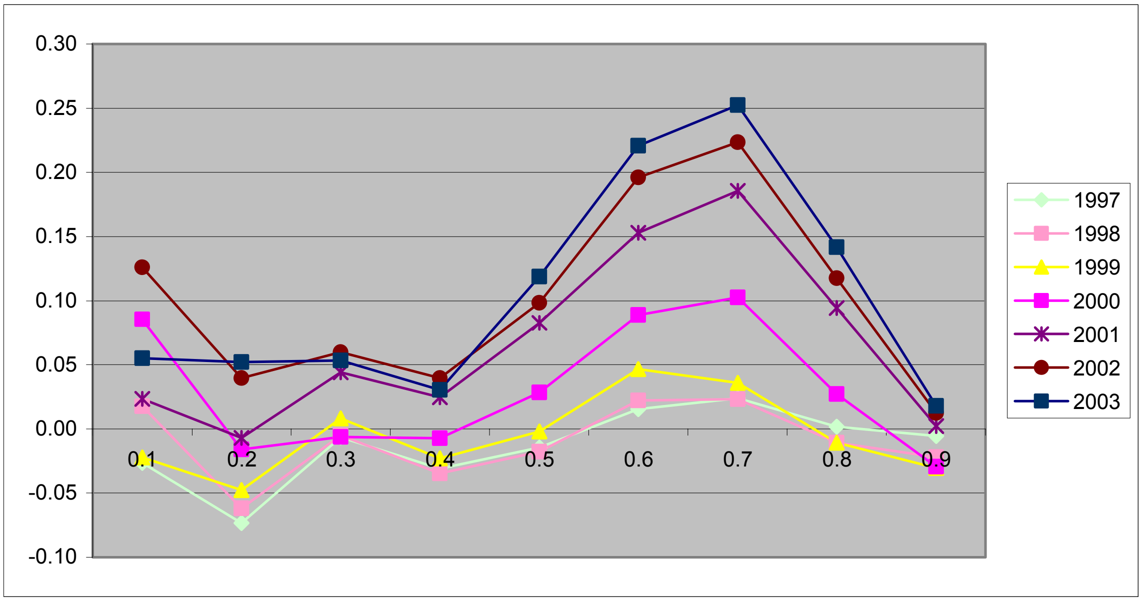
Table 8: Regression estimates of effects on earnings, earnings in $000

	Percentile regression									OLS
	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	
Effects on those who have attained 65-69										
Constant	1.2611	3.7817	6.5156	8.7451	10.4437	12.5956	16.0643	22.1667	35.3851	11.5920
	(.0511)	(.1118)	(.1019)	(.1564)	(.1523)	(.1986)	(.2661)	(.3703)	(.5893)	(.7176)
Treatment dummy, 2000	0.0226	-0.1162	-0.4192	-0.1956	-0.0847	0.4013	0.1802	-0.1921	-1.4246	0.0291
	(.0529)	(.0852)	(.1049)	(.1704)	(.1622)	(.2163)	(.2863)	(.4263)	(.8158)	(.8684)
Treatment dummy, 2001	-0.0819	-0.3305	-0.3824	-0.2646	0.1469	0.7335	0.9565	1.2221	-0.5214	0.5189
	(.0474)	(.1051)	(.0991)	(.1694)	(.1687)	(.2161)	(.3102)	(.4273)	(.6319)	(.8616)
Treatment dummy, 2002	-0.0135	-0.2453	-0.4848	-0.3165	0.1112	1.0662	1.4596	1.4536	-0.6260	-0.7408
	(.0545)	(.1013)	(.1039)	(.1507)	(.2053)	(.2809)	(.2971)	(.4973)	(.7177)	(.8528)
Treatment dummy, 2003	-0.1236	-0.3394	-0.6633	-0.5580	0.0609	1.1379	1.6702	1.5430	-0.6693	0.0322
	(.0384)	(.1223)	(.1141)	(.2203)	(.1657)	(.2566)	(.2864)	(.4734)	(.8642)	(.8444)
N: 429,449										
R-square	0.0053	0.0131	0.0194	0.0239	0.0372	0.0517	0.0581	0.0609	0.0672	0.0149
Effects on those turning 65										
Constant	1.8091	4.9622	8.3903	10.7848	12.5908	16.4331	21.9045	30.3644	43.1540	16.8818
	(.0718)	(.1252)	(.1297)	(.1776)	(.1718)	(.2936)	(.3609)	(.4686)	(.7872)	(.9468)
Treatment dummy, 2000	0.0547	0.2140	0.1771	0.8382	1.5987	1.6765	1.5675	1.2879	1.1383	-1.2780
	(.1045)	(.202)	(.2092)	(.2543)	(.4175)	(.4982)	(.5302)	(.62)	(.8661)	(1.4282)
Treatment dummy, 2001	0.1682	0.1408	-0.0576	0.3256	1.5221	1.7235	1.4488	0.3402	-0.1752	-1.3841
	(.0979)	(.2141)	(.2366)	(.3364)	(.3633)	(.4453)	(.5336)	(.6856)	(1.2814)	(1.4169)
Treatment dummy, 2002	0.0372	0.1992	0.1845	0.5874	2.3427	2.5045	1.9187	0.5939	0.3488	-1.3584
	(.0865)	(.2363)	(.2226)	(.3308)	(.2967)	(.3754)	(.5043)	(.7411)	(1.4093)	(1.4012)
Treatment dummy, 2003	0.1207	0.2729	0.2287	0.6025	2.1035	2.3703	2.8352	0.9764	1.1521	0.9228
	(.1185)	(.208)	(.1878)	(.2295)	(.3859)	(.5114)	(.5456)	(.9951)	(1.4436)	(1.3781)
N: 315,032										
R-square	0.0150	0.0121	0.0178	0.0229	0.0363	0.0468	0.0533	0.0598	0.0686	0.0146

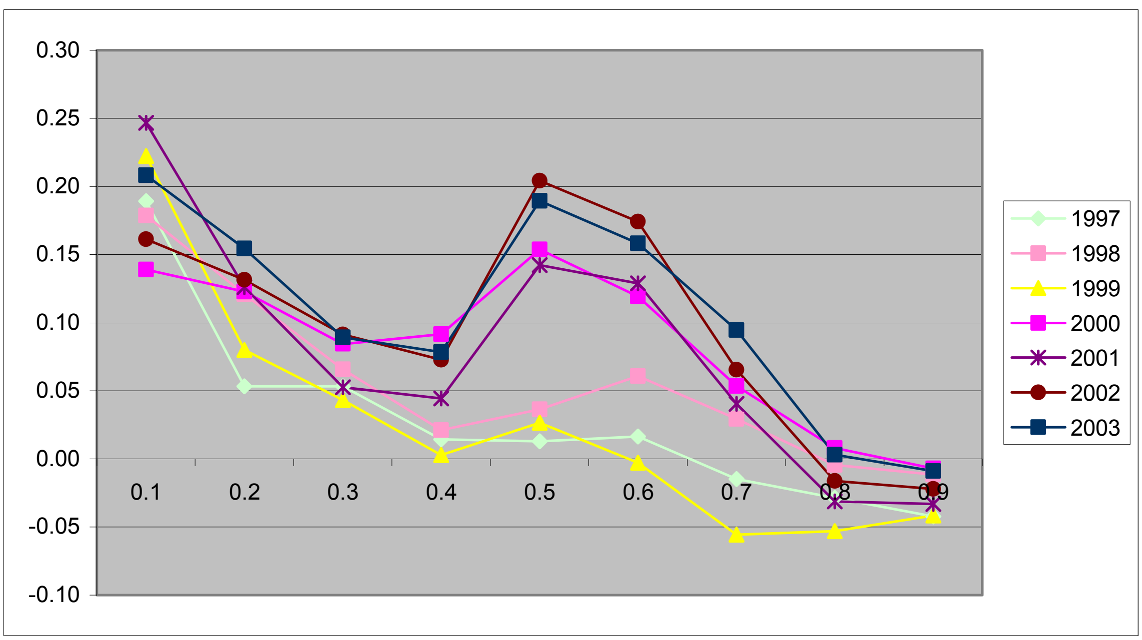
Note: The dependent variable is annual earnings in $000. The samples include observations with non-zero earnings. Numbers in parentheses are standard errors. Standard errors are calculated by bootstrap resampling with 40 repetitions. Other covariates used in this regression are constant, Male, Race (white), age group dummies (62-64 and 70-72) calendar year dummies from 1996 through 2002.

Figure 4: Estimates of treatment dummies, logged earnings, by deciles and years

Have attained ages 65-69



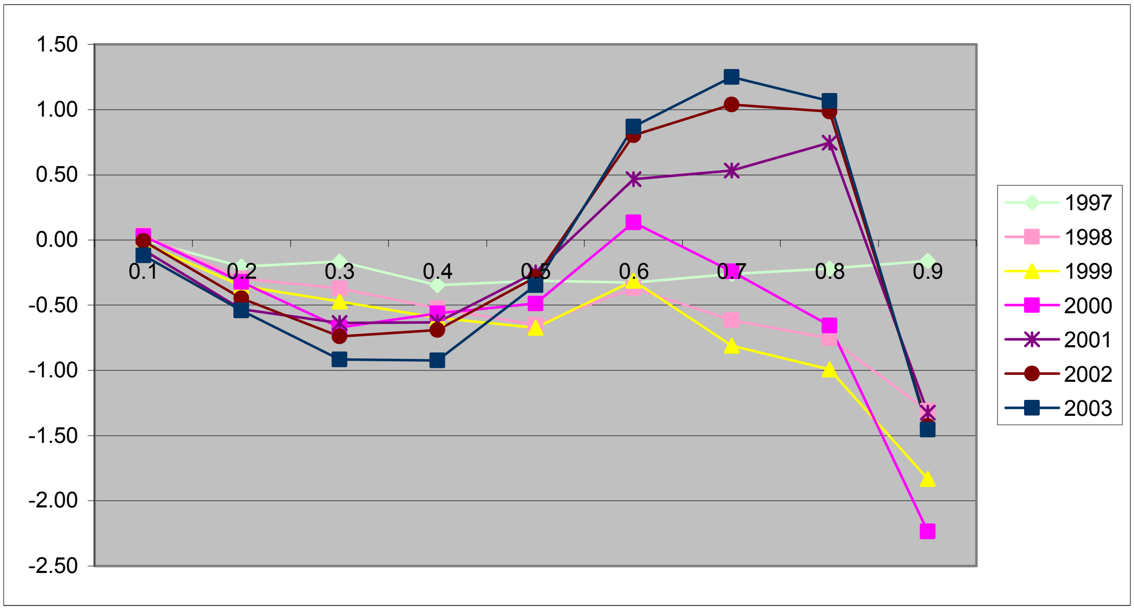
Turning 65



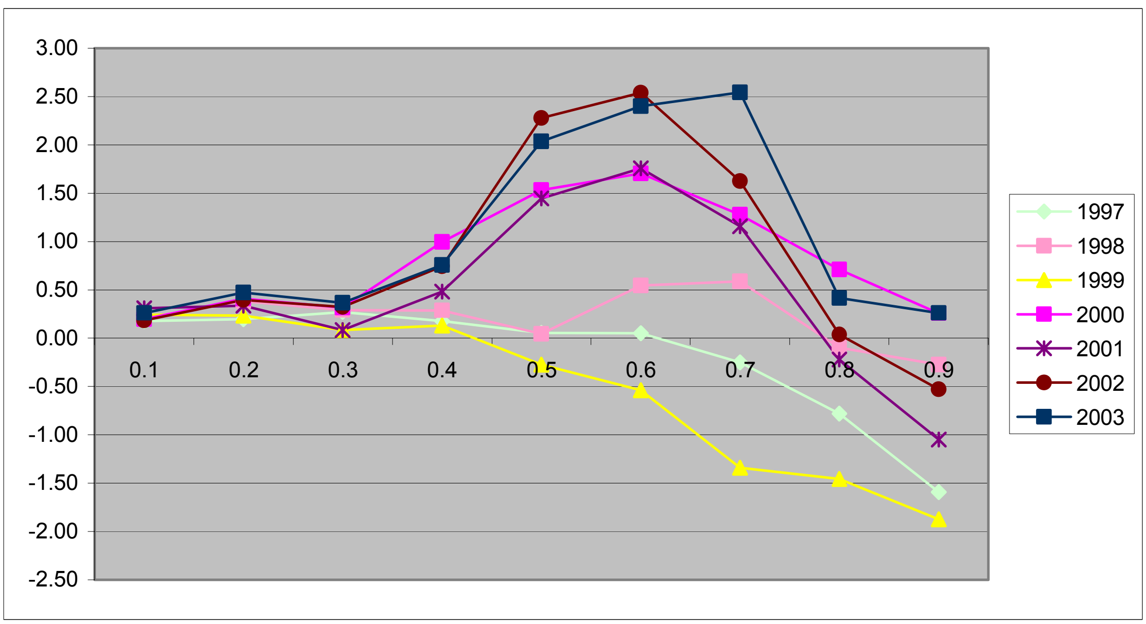
Note: The dependent variable is the log of current earnings. The samples include observations with non-zero earnings. Other covariates used in this regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1996 through 2002.

Figure 5: Estimates of treatment dummies, earnings in $000, by deciles and years

Have attained ages 65-69



Turning 65



Note: The dependent variable is annual earnings in $000. The samples include observations with non- zero earnings. Other covariates used in this regression are a constant, Male, Race (white), age group dummies (62-64 and 70-72), and calendar year dummies from 1997-2002.