FISCAL EFFECTS OF SOCIAL SECURITY REFORM IN THE UNITED STATES

Courtney Coile*
Jonathan Gruber

CRR WP 2003-05
April 2003

Center for Retirement Research at Boston College
550 Fulton Hall
140 Commonwealth Ave.
Chestnut Hill, MA 02467
Tel: 617-552-1762 Fax: 617-552-1750
http://www.bc.edu/crr

*Courtney Coile is the Assistant Professor of Economics at Wellesley College. Jonathan Gruber is a Professor of Economics at the Massachusetts Institute of Technology. The authors thank David Wise and other members of the International Social Security Working Group for helpful suggestions. The research reported herein is an extension of work supported by the Center for Retirement Research at Boston College performed pursuant to a grant from the U.S. Social Security Administration (SSA) funded as part of the Retirement Research Consortium. The opinions and conclusions are solely those of the authors and should not be construed as representing the opinions or policies of the Social Security Administration or any agency of the Federal Government, or of the Center for Retirement Research at Boston College.

About the Center for Retirement Research

The *Center for Retirement Research at Boston College*, part of a consortium that includes a parallel center at the University of Michigan, was established in 1998 through a 5-year grant from the Social Security Administration. The goals of the Center are to promote research on retirement issues, to transmit new findings to the policy community and the public, to help train new scholars, and to broaden access to valuable data sources. Through these initiatives, the Center hopes to forge a strong link between the academic and policy communities around an issue of critical importance to the nation's future.

Center for Retirement Research at Boston College
550 Fulton Hall
140 Commonwealth Ave.
Chestnut Hill, MA 02467
phone: 617-552-1762 fax: 617-552-1750
e-mail: crr@bc.edu
http://www.bc.edu/crr

Affiliated Institutions:

Massachusetts Institute of Technology
Syracuse University
The Brookings Institution
Urban Institute

The Old-Age, Survivors, and Disability Insurance (OASDI) program faces a serious long-term solvency crisis. The 2001 Trustees' Report projects that the OASDI trust funds will be exhausted in 2038 and that an immediate and permanent tax increase of 1.86 percent of taxable payroll would be needed to restore solvency for the next 75 years. Over the past several years, many Social Security reforms have been suggested to address the solvency crisis, from further increases in the normal retirement age to partial privatization of the system.

Many of these proposals would improve the fiscal balances of the OASDI program by cutting benefits, raising taxes, or both. However, the fiscal implications of these reforms depend critically not just on the static impacts of the reforms on benefit payments and tax collections, but also on dynamic responses of individuals to changes in program incentives. In particular, there is a large literature over the past two decades which suggests that retirement decisions are responsive to the parameters of the Social Security system. If reform alters retirement patterns, this will in turn impact benefit payments and tax collections both inside and outside of the Social Security system. For example, if raising the early entitlement age for Social Security leads to later retirement, this may significantly improve the government's fiscal position above and beyond the savings from starting payments later in life.

While some previous studies of Social Security and retirement have forecast the effect of various reforms on labor supply, little of the work in the U.S. has focused on the impact of reforms on the fiscal position of the government. That is, there has been little attempt to date to marry dynamic models of retirement responsiveness to estimates of the impact of reform on fiscal balances.

We propose to incorporate labor supply responses into our simulations of the effect of Social Security reforms on older workers' net fiscal contributions to OASDI. Such reforms will have both an automatic effect on fiscal contributions by changing contributions and benefits for a given work history (the "mechanical" effect) and an additional effect through labor supply responses to the reform (the "behavioral" effect). We will estimate the fiscal implications of both the mechanical and the behavioral effect, using retirement models to predict labor supply responses. The result will be an estimate of the steady-state impact of the reforms on the financial balance sheet of the OASDI program. We will also include income and consumption taxes in our analysis in order to examine the effect of the reforms on total government finances.

To be clear, we are not engaging in a full blown solvency analysis along the lines of that carried out by the Social Security Administration (SSA). We do not consider the impact of reform on both transition and long run system finances. Rather, for illustrative purposes, we follow one cohort of workers, and illustrate the impacts of reforms on the benefits paid to, and the taxes collected from, this cohort. This gives some guide as to the percentage effects of reforms on system balances.

The remainder of the paper is organized as follows. In section I, we provide some background on the Social Security program and on the previous literature on Social Security and retirement. In section II, we discuss the data and empirical strategy we employ to estimate the effect of reforms on workers' net fiscal contributions to OASDI. In section III, we present our results. In section IV, we analyze the distribution effects of the proposed policy changes. In Section V, we conclude.

Section I: Background

Institutional Features of Social Security

As this paper focuses on labor supply responses to Social Security reform, a brief overview of the Social Security program is necessary to understand how the program affects retirement; see Diamond and Gruber (1998) for a more detailed review. An individual is entitled to retired worker benefits once he or she has worked forty quarters in covered employment. Benefits are calculated in several steps. Annual earnings are indexed by an average wage index and the 35 highest years of earnings are used to compute the average indexed monthly earnings (AIME).[1] A progressive formula is applied to the AIME to obtain the primary insurance amount (PIA). Finally, the PIA is adjusted to obtain the monthly benefit amount based on when benefits are first received. Individuals claiming at the normal retirement age (NRA, legislated to grow slowly from 65 to 67) receive the PIA. Individuals can receive benefits as early as age 62 (the early retirement age, or ERA), or can delay until age 70. Benefits are reduced by 6.67% for each year of receipt prior to the NRA and are increased by a delayed retirement credit of 3% to 8% for each year receipt is postponed past the NRA, depending on the worker's birth year.[2] Benefit receipt is subject to an earnings test before age 65, whereby earnings above a floor amount reduce benefits currently, and cause them instead to be paid out (with an actuarial adjustment) upon full retirement. Spouses of beneficiaries also receive a dependent benefit equal to 50% of the worker's PIA or a survivor benefit equal to 100% of the worker's PIA, although the spouse receives only the larger of this and his or her own retired worker benefit. Benefits are funded with a payroll tax of 12.4%, paid half by employers and half by employees.

[1] Earnings after age 60 are in nominal dollars, increasing the incentive to work at these ages.
[2] The delayed retirement credit (DRC) is rising from 3% for workers born prior to 1925 to 8% for workers born after 1942. For workers with a NRA above 65, benefits are reduced 5% per year for receipt more than 3 years before the NRA.

Additional work affects Social Security wealth in several ways. First, the additional year of earnings may replace an earlier year of zero or low earnings in the AIME calculation, raising the monthly benefit. Second, work beyond age 62 implies a delay in claiming benefits (if earnings are significantly above the earnings test floor). Benefits are foregone for a year, but future benefits are higher due to the actuarial adjustment. Finally, additional work results in additional payroll taxes. The combination of these three effects determines whether the Social Security system provides a return to additional work that is more or less than actuarially fair.

Previous Related Literature

While there is little work that that has incorporated labor supply responses to Social Security reforms into estimates of the effect of reforms on the government's fiscal position, there is a large previous literature that has explored the effect of Social Security on retirement decisions. A brief overview of this literature follows; for a more detailed review, see Diamond and Gruber (1998).

While a few studies have used aggregate information on the labor force behavior of workers at different ages to infer the role played by Social Security, most studies have attempted to specifically model the role that benefits play in determining retirement.[3] Early studies estimated reduced form models of the retirement decision as a function of Social Security wealth;[4] however, more recent literature has also incorporated increases in wealth resulting from additional work. Some studies did this by incorporating the accrual of Social Security wealth resulting from one additional year or work, others by estimating structural models of retirement

[3] Hurd (1990) and Ruhm (1995) are good examples of studies using aggregate data.
[4] For more recent examples of this literature, see Diamond and Hausman (1984) and Blau (1994).

decisions by workers facing a lifetime budget constraint.[5] Typically, these studies found that Social Security played an important role, albeit one that could only explain a fraction of the decrease in older men's labor supply during the post-WWII era.

Stock and Wise (1990a,b) made the important observation that it is not simply the increment to retirement wealth with one additional year of work that matters, but rather the entire evolution of future wealth with further work. They developed an option value model that posited retirement decisions as a function of the difference between the utility of retirement at the current date and at the date which maximizes one's utility. The critical contribution of this approach was to model retirement decisions in a forward looking framework which considered the impact of the path of future incentives on retirement. This approach was extended from firm-specific to national data by Samwick (1998), and it shows once again modest effects of Social Security, but much larger effects of private pensions.

Coile and Gruber (2000) recognized that the vast majority of variation across individuals in option value resulted from wages and developed an alternative measure, peak value, which measures the financial gain from delaying retirement to the age at which Social Security wealth is maximized. They also found that Social Security has a significant but modest effect on retirement decisions.

A final relevant article is Coile and Gruber (2001), which explores whether the Social Security program provides strong incentives or disincentives for work at particular ages. They find that, once payroll taxes are included, the median male worker faces a small tax on work through the Social Security system at ages 55-61, a near-zero tax at ages 62-64, and a large tax at 65-69. The actuarial unfairness of the system at some ages suggests that labor supply responses

[5] For examples of the former, see Fields and Mitchell (1984) and Hausman and Wise (1995); for example of the latter, see Burtless (1986), Gustman and Steinmeier (1985, 1986) and Rust and Phelan (1997).

to Social Security reforms may have a beneficial effect on the government's fiscal position if the reforms encourage more years of work at those ages.

Part II: Data and Empirical Strategy

Data

The data used in the analysis is the Health and Retirement Study (HRS). This is a survey of persons born 1931-1941 and their spouses, with interviews every two years starting in 1992. The HRS contains extensive information on employment, health, and family structure. For the purposes of this paper, the critical feature is that the HRS is linked to Social Security earnings histories, allowing accurate calculation of the retirement incentives arising from Social Security.[6]

The sample for the analysis is all men and single women in the 1931-1941 birth cohorts who are working at age 55 and have non-missing Social Security records for themselves and their spouses. Benefits accruing to married women are included on their husband's record (this includes the women's retired worker, dependent, and survivor benefits). We assume that married women retire at the initial ERA, eg, at 62. When we simulate reforms to the system, we continue to assume that women retire at 62 and claim benefits at first availability. The purpose of maintaining the same retirement age is to avoid building a behavioral response by women into the "mechanical" effect. The final sample size is 3,060 persons.

For each person in our sample, we have earnings histories which can allow us to compute their Social Security benefit entitlement at each retirement age (or age of death). The critical assumption involved in doing so is projecting their earnings into future years. In our earlier

[6] The HRS also includes information from employers on private pensions. In this analysis, we will ignore pensions, as our focus is on Social Security reform, and it is difficult to forecast how pensions might change in response to a

work, we found that these projections work best if we assume no real earnings growth from the current age forwards until retirement. Given these earnings projections, we can also compute the payroll tax obligations of workers at future ages.

A key contribution of our simulations is that we will consider the impact on the entire government fiscal position, not just on Social Security in a vacuum. Doing so requires modeling the impact of additional years of work on income and consumption tax revenue as well, and we describe our approach for doing so below. This approach does not provide a perfect picture of the full fiscal impact of reforms. For example, there will be effects on other much smaller retirement income support programs when Social Security is reformed, such as the Supplemental Security Income (SSI) program. But these effects are difficult to model, since these other programs may change as well through reform. We assume that the effects are sufficiently modest that they do not bias our overall assessment of the fiscal implications of reform.

Empirical Strategy

Our goal is to estimate how changes to the Social Security program would affect the net fiscal position of OASDI with respect to a particular cohort of workers, those born between 1931 and 1941, who were working at age 55. Once again, this approach is not designed to provide a full picture of the full implications of reform for program solvency. Rather, it provides a snapshot of the relative magnitude of effects that might be observed when reform impacts a particular slice of birth cohorts.

We calculate Social Security wealth in the base case for our sample of age-55 workers and their families using the following approach. Each age-55 worker will exit the labor force

---

change in Social Security rules.

sometime over the next twenty years, either by retiring or by dying prior to retirement.[7] Thus, there are forty possible exit paths out of the labor force, or forty states of the world, corresponding to retirement or death at each age from 55 to 74. We obtain the weighted average Social Security wealth by multiplying the probability of each state by the Social Security wealth received in that state.

The probability of each state is obtained as follows. We calculate the conditional probability of dying at each age from age- and sex-specific US life tables.[8] We calculate the probability of retiring at each age conditional on being in the labor force using models of retirement behavior from Coile and Gruber (2003).[9] The central results from that paper are reproduced in Table 1. We estimated retirement models as a function of both the level of Social Security Wealth (the expected PDV of net transfers from the Social Security system from your current age forward), and two different dynamic measures of retirement incentives. The first is option value, as pioneered by Stock and Wise (1990). This measure, as noted above, captures the difference between the utility of retiring today, and retiring at the age when utility is maximized, as a function of both future wages and retirement benefit entitlements. Thus, if this is positive, then there are gains to delaying retirement, and these gains rise with the value of the option value term (so that we expect a negative impact of option value on retirement). The second is the peak value, as described in Coile and Gruber (2000). This measure focuses solely on retirement income, as opposed to total financial returns to work, in order to distinguish retirement income effects from wage effects (which might be unobservably correlated with tastes

[7] For the purpose of our calculation, we will assume everyone retires by age 74. We do not use workers' observed labor force exit, as many workers will not have exited the labor force by the 2000 HRS. Rather, we use projected labor force exits from the empirical models described herein.
[8] Life tables are from the 1995 OASDI Trustees Report, intermediate assumptions case.
[9] To be precise, this probability is also conditional on being alive at the beginning of this age and not dying at this age. Thus, 100% of workers at each age are accounted for either through exit to death, exit to retirement, or continued labor force participation.

for work). So this measure is the difference between the maximum value of the PDV of retirement income and the value if the individual retires today. Once again, as peak value is larger, the returns to delaying retirement rise, so that we expect a negative coefficient in a retirement equation.

Both models also include controls for age, flexible functions of earnings and lifetime earnings, and education, race, region, industry, and occupation dummies. A central issue that is the focus of our earlier paper is the correct approach to specifying the impact of age in these retirement models, particularly the use of age dummies vs. linear age. If there are strong correlations between wealth or dynamic incentives and particular ages, then including age dummies might absorb some of the impacts of the program on retirement decisions. On the other hand, if there are nonlinear impacts of age on retirement decisions, then including a linear age term may lead to biased estimates of the program incentive effects. Thus, we estimate the models both ways in Table 1.

In this work, we have found fairly consistent evidence for significant effects of program incentives on retirement decisions. Table 1 shows the key coefficients from these models. In each cell, we show the probit coefficient, the associated standard error, and the impact of a $10,000 increment to SSW, or a $1000 increment to peak value. For men, peak value and option value each have a negative and significant effect on retirement, while Social Security wealth has a positive, though not always significant, effect. The results suggest that each $10,000 in Social Security Wealth raises the odds of retirement by 0.1 to 0.25 percentage points, from a rate of 5.7 percentage points. Each $1000 in peak value, on the other hand, lowers the odds of retirement by 0.04 to 0.05 percentage points. We can’t really interpret the option value coefficient as such, since it is in utility terms. Our results are fairly similar for women. The major differences are that the SSW terms are more consistently significant, and the peak value terms are now insignificant.

We apply the coefficients from those models to each individual's characteristics to obtain a predicted probability of retirement at each age for each individual. That is, this model provides us with baseline estimates of retirement by age.

Next, the expected net present discounted value of Social Security wealth is calculated for each possible labor force exit path (retirement or death age each of the 20 ages 55-74). For single workers, Social Security wealth is simply a sum of future benefits, discounted by time preference and survival probabilities. For married workers, it is more complicated, since we must include dependent spouse and survivor benefits and retired worker benefits for the spouse and account for the joint likelihood of survival of the worker and dependent. We use a real discount rate of 3% and survival probabilities from the age- and sex-specific life tables. Finally, we multiply the probability of each state times the Social Security wealth in that state for each individual, then average over all individuals to obtain the average base case Social Security wealth for the sample.

This same approach can then be used to compute the fiscal implications of reform, in two steps. First, we measure the impact of reform on both Social Security Wealth and on option/peak value at each age. We can then use these new "post-reform" values to compute a new odds of retirement at each age, based on our regression coefficients in Table 1. We assume that mortality is not affected by reform. Second, we multiply these new odds of exit by the new stream of net SSW from either death or retirement at each age. In this way, we obtain the new fiscal position for this cohort from reform.

As this discussion makes clear, however, there are two distinct effects of reform that are of interest: the fiscal effects of reform that arise automatically due to changes in program rules and those that arise due to labor supply responses. The "mechanical effect" is the change in Social Security wealth that arises solely from the change in program rules, holding retirement probabilities constant, while the "behavioral effect" is the additional change in Social Security wealth that results from the change in retirement probabilities, holding wealth constant at its post-reform level. The fiscal implications of the mechanical and behavioral effects are calculated as follows:

- Mechanical Effect = $\sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{B} SSW_{is}^{R} - \sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{B} SSW_{is}^{B}$
- Behavioral Effect = $\sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{R} SSW_{is}^{R} - \sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{B} SSW_{is}^{R}$
- Total Effect of Reform = $\sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{R} SSW_{is}^{R} - \sum_{i=1}^{N}\sum_{s=1}^{48} P_{is}^{B} SSW_{is}^{B}$

where i is individual, s is state (exit to death or retirement at each age), B is base, and R is reform. Thus, the mechanical effect is the impact of letting SSW change from before to after reform, but holding retirement behavior constant; the behavioral effect is the impact of letting exit probabilities change from before to after reform, but holding SSW constant. The sum of the mechanical and behavioral effects is equal to the total effect.

The net present discounted value of income and consumption taxes are computed using the same methodology as Social Security wealth. Again, there are forty possible exit paths out of the labor force, and each path corresponds to certain expected future income flows. For example, in the case where the worker retires at age 55, there are three possible amounts of household income in each future year, depending on whether the husband, wife, or both are alive in that year. Taxes are computed for each of the three possible income amounts, then the stream of taxes is discounted for time preference and mortality risk. The income taxes paid each year are calculated using a simple tax calculator based on the 2000 US income tax code; households are assumed to take the standard deduction and tax rules regarding the taxation of Social Security benefits are incorporated. Consumption taxes are assumed to be 4.5% of income; 4.5% is the ratio of state and local sales and excise taxes to personal disposable income for 2000.

Part III: Results

The Reforms

We simulate three different reforms to the U.S. Social Security system. The first reform is a three-year increase in the ERA and NRA, to 65 and 68, respectively. This reform will significantly reduce Social Security Wealth at any age, since benefits receipt begins much later in life. The reform will also reduce incentives for continued work at younger ages, since the peak value of SSW is so much lower; but it will increase incentives for work after age 65, since the actuarial adjustment is now so much larger in that age range.

The second reform is a change in the actuarial adjustment to 6% per year. This is actually only a small change to the current US system, since the actuarial adjustment is equal to 6.67% between ages 62 and 65 and is between 5% and 7.5% above age 65 for workers in these birth cohorts. But this is a much larger change in the other countries in this project, which do not currently have actuarial adjustments. In the U.S. context, this change will lead to a reduction in SSW at younger ages, which will promote retirement, but also a reduction in the dynamic incentive to continue work. At older ages, the effects will vary by birth cohort.

The third reform is a move to a system with a flat 60% replacement rate of the AIME at age 65, an early eligibility age of 60, and a 6% annual actuarial adjustment between ages 60 and

70.[10] The third policy is not viewed as being a realistic policy reform for the US, but is presented to illustrate the effects of moving to a more generous system, more similar to those in European countries. This policy will significantly increase Social Security Wealth, leading to earlier retirement, but will also significantly increase the financial benefits to longer work life, since the dollar benefits from additional work are rising so substantially, while the actuarial adjustment is similar to current law.

One issue that arises in simulating policy reforms is how the reforms will affect individuals' tendency to retire at particular ages, as reflected by the age dummies in the retirement model. For example, two of the three policies change the early retirement age, and it seems quite likely that the spike in the retirement hazard at age 62 might be altered as a result of the change. However, it is difficult to predict exactly how the retirement hazard might change. We propose to deal with this issue by using two alternative assumptions about the age dummies. The first is to leave the age dummies unchanged by the policies and the second is to shift the age dummies as seems appropriate. For the first policy, we shift the age dummies back by three years, so that the age 62 spike is moved to age 65, the age 65 spike to age 68, etc. For the second policy, the age dummies are unaffected, while for the third policy, we shift the age 62 dummy to age 60 and make several other small adjustments. We also present results using the linear age model.

Results

The results of the analysis for the typical age-55 household, averaging over married couples and singles, are shown in Table 2. We present six panels, corresponding to the six specifications we estimate: linear age, age dummies with no shift in their value from reform, and

[10] This system also has a 100% survivor benefit, though no dependent spouse benefit.

age dummies with a shift in value from reform, each for the peak and option value models. In each panel, we show rows for: Social Security Benefits, payroll taxes, income taxes, consumption taxes, and total tax payments. We show columns for the base case, and then for each of the three reforms. Finally, the last three columns show the percentage effects from each of the three reforms.

Consider the first panel, which shows the peak value model, with linear age controls. In the base case, averaging over the forty possible labor force exit paths, the typical age-55 household has expected future Social Security benefits of $196,503E (2001 Euros), expected future Social Security payroll taxes of 58,681E, and expected total future taxes of 180,191E. It is important to note that the majority of future tax payments come not from payroll taxes but from income taxes. This highlights the value of government-wide simulations, as opposed to simulations that focus on the Social Security system in a vacuum.

The total effect of the ERA/NRA increase reform is to lower benefits in this case by 18.3%, to $160,526E. Payroll taxes rise, as do income taxes, due to longer working lives. But consumption taxes fall, as the higher labor income does not offset lower Social Security benefits, leading to falling disposable income. In total, tax revenues rise by 2.1%, to $183,983E.

The effect of the actuarial adjustment reform is much smaller; benefits rise by only 1.1% and taxes fall by 0.8%. The effect of the common reform is the largest of all, with a rise in benefit payments of 43.6%, and a total rise in tax payments of 4.4%. All six models (peak value vs. option value, linear age vs. age dummies with or without shift) generate similar predictions of the effect of the reforms on benefits, though the effect of the reforms on taxes varies more across the models.

Table 3 decomposes the total effect of reform into two components, the mechanical effect and the behavioral effect. Once again, we present one panel for each estimated model. Each panel has three sets of columns, for the three reforms. In each set of columns, we show the medical effect, the behavioral effect, and the total effect of reform.

In the case of Social Security benefits, the mechanical effect is responsible for the vast majority of the total effect. For example, in the peak value model with linear age controls, the ERA/NRA increase reform mechanically cuts benefits by 35,934E. Incorporating labor supply responses to the reform has an additional beneficial effect on program solvency, but the effect is very small: benefits drop by a further 44E, or less than 0.1% of base case benefits. In some of the other models, the behavioral response to this reform actually results in an increase in benefits – for example, in the option value model with age dummy shift, benefits rise by 1,249E. However, in all models, the magnitude of the behavioral effect remains very small relative to the magnitude of the mechanical effect.

This is the case for the other two reforms as well. For both the change in actuarial adjustment and the common reform, the vast majority of the effect on Social Security payments is through the mechanical effect.

In the case of taxes, the behavioral effect is often larger than the mechanical effect and can vary significantly across models. For example, in the first panel, the mechanical effect of the ERA/NRA increase reform is to reduce taxes by 2,706E, while the behavioral effect is to raise taxes by 6,499E, so that taxes increase on net. For this reform, the behavioral effect on taxes is particularly pronounced in the models with age dummy shifts in the third and sixth panels. On the other hand, for the common reform, the mechanical effects of taxes are much larger in all cases, although the offsetting behavioral affects are of a similar order of magnitude in the option value model with shifting age dummies.

The final rows of each panel in Table 3 show the net change in the government's fiscal position for this cohort as a result of reform, and that net change as a percentage of baseline benefits. For the increasing ERA/NRA reform, we find that there is a total reduction in net government outlays of roughly $40,000E to $47,000E, depending on the model. This represents 28-35% of baseline benefits. The majority of this impact comes from mechanical effects. At most one-third, and generally less than one-fifth, comes from behavioral effects, and this is exclusively through the tax side.

As noted, the impacts of the actuarial adjustment reform are much more modest. There is an increase in government outlays of $3000-$3800, or 2-2.8% of baseline benefit payments. In this case, behavioral effects play a larger role, explaining about one-third of the total change in fiscal position.

The common reform has the most substantial impact on fiscal positions. Net payments rise by over 50% in all simulations. This case also features the smallest relative contribution from behavioral responses; only about 10% or less of the effect of reform comes through behavioral responses. This is because most of the fiscal impact of this reform is on the benefits side, and not the tax side, so that the small behavioral effect on benefits implies an overall small behavioral effect.

To better understand why the fiscal implications of the behavioral effect on Social Security wealth are relatively small, it is useful to recall that this is the additional effect of labor supply responses on fiscal balances, holding Social Security wealth constant at the post-reform level. In order for the labor supply responses to have an additional effect on Social Security financees, two conditions must be met: reforms must significantly impact retirement decisions, and the Social Security system (benefits net of payroll taxes) must be less or more than actuarially fair. Even if there is no additional beneficial effect on Social Security program finances, reforms may improve overall government finances if they encourage workers to retire later and this results in higher lifetime income and consumption taxes.

Figure 1 shows Social Security benefits by age of retirement in the base case and in the ERA/NRA reform case. In the base case, Social Security wealth rises with age of retirement until peaking at age 69, making it appear that the system provides some return to additional work. However, when payroll taxes are included, the system is close to actuarially fair. For example, Social Security wealth in the base case rises from about 195,000E at age 60 to about 234,000E at age 69; however, the increase in payroll taxes over the same period (not shown on graph) is about 44,000E, making the net return to additional work a loss of approximately 5,000E. Under the ERA/NRA reform, benefits are lower but the system (including payroll taxes) remains roughly actuarially fair. Thus even if this policy change induces people to change their retirement behavior, such changes will have little fiscal impact on the Social Security system because it is close to actuarially fair.

Figure 2 illustrates how the sum of payroll, income, and consumption taxes varies with age of retirement. As discussed above with respects to payroll taxes, the present discounted value of lifetime taxes rises with age, and this is true for other types of taxes as well. However, while the rise in payroll taxes roughly counteracts the rise in Social Security benefits with later labor force exit, the total rise in taxes greatly exceeds the rise in benefits. As a result, the net fiscal implications of longer work lives is positive: while Social Security is roughly actuarially fair, the increase in income and consumption taxes imply gains to the government from longer work lives.

Figure 3 shows the distribution of retirement ages pre- and post-reform in the option value model with no shift of the age dummies. The reform is found to reduce the probability of retirement slightly at ages 55-64 and to increase it slightly at ages 66-74. But these effects are, in general, fairly small. Thus, it should not be surprising that there is relatively little behavioral effect on fiscal positions from this reform: there is relatively little impact on behavior, and any changes in behavior have modest impacts because the system is roughly actuarially fair.

Figure 4 puts the information in Figures 1-3 together to show the total effect of the reform on Social Security wealth, both gross and net of all taxes, by age of retirement. The gross and net effects by age are always negative, as this reform is a large benefit cut. The effects are largest at ages 62-65 because the retirement probabilities are relatively high at these ages; put simply, most of the fiscal savings from this reform come from people who retire at ages 62-65 because there are so many of them.

Figures 5 and 6 repeat Figures 3 and 4 under the assumption that the age dummies shift by three years as a result of the reform. Here, there are much larger behavioral responses to reform, since we are by construction assuming that there is an enormous change in retirement behavior (by shifting the age dummy coefficients). As one would expect, the retirement probabilities now decline sharply at ages 62-64 and rise sharply at ages 65-68. As a result, the reform now saves a larger amount of money at ages 62-64, since there are so many fewer people retiring then, but costs more money at ages 66-68 because of the increase in people retiring at those ages.

Finally, Figure 7 compares the fiscal implications of reform for one birth cohort as a percent of GDP for the six models used. In all cases, the mechanical effect leads to a savings of about 0.45% of GDP and the behavioral effect leads to an additional savings of about 0.10% of GDP, and slightly more in model with age dummy shifts. Thus we conclude that most of the effect of the policy reform on government finances results from the mechanical effect of the change. Labor supply responses to the policy have little additional effect on Social Security program solvency because the system is close to actually fair, though they do have a small beneficial effect on total government finances as a result of higher lifetime income and consumption taxes paid.

Next, we examine whether this finding will also apply to the two other reforms, the actuarial adjustment reform and the common reform. Figure 8 shows that the system is roughly actuarially fair (once payroll taxes are included) in both the base case and actuarial adjustment reform. Figure 9 shows that there are only small changes in retirement probabilities resulting from this reform in the option value model with no age dummy shift. Figure 10, like Figure 7, compares the fiscal implications of this reform using all six models. As the reform represents only a small change from the current US system, it is found to cause a mechanical increase in the cost of the program of only 0.03% of GDP; the behavior effect raises the cost by an additional 0.01%-0.02% of GDP.

Figures 11-13 explore the effects of the common reform. Under this reform, the system is now more than actuarially fair, as the generous 60% replacement rate rewards additional work by more than enough to offset the additional payroll taxes. For example, working from age 60 to age 69 raises Social Security wealth net of payroll taxes by over 41,000E. Due to the wealth effect, this reform induces people to retire earlier, as shown in Figure 12; as the system is more than fair, earlier retirement will benefit Social Security program finances, though it will hurt overall government finances by lowering lifetime income and consumption taxes. As shown in Figure 13, the fiscal implications of this reform are a mechanical increase in program costs of almost 1% of GDP and an additional increase in costs of 0.1%-0.2% of GDP as a result of the behavioral response, as workers retire earlier and pay fewer taxes.

To restate our central conclusion, the fiscal implication of the behavioral effect is quite small relative to the mechanical effect of the reforms, typically on the order of 10-20% of the total effect. Reforms may lead to significant changes in retirement behavior, particularly in models including shifts of the age dummies. However, as the Social Security system (including payroll taxes) is roughly actuarially fair, inducing earlier or later retirement has only a second-order effect on program solvency, though it may affect overall government finances by changing the amount of lifetime income and consumption taxes paid.

Part IV: Distributional Analysis

Finally, we examine the effect of these reforms on people in different parts of the income distribution. Tables 4 and 5 show the effect of the three reforms by family AIME quintile using the option value models first without (Table 4) and then with (Table 5) shifts of the age dummies. This comparison implicitly highlights the importance of behavioral effects, since these effects are much larger in the model with age dummy shifts.

In the model without an age dummy shift, the ERA/NRA increase reform is found to affect all quintiles similarly: the change in Social Security benefits net of all taxes is equal to a loss of 19.8% of base benefits for the top quintile vs. a loss of 17.7% of base benefits for the lowest quintile; naturally, the absolute dollar losses are much larger for the top quintile. In the model with an age dummy shift, however, the top quintile experiences a relatively larger loss, 25.2% vs. 18.9% for the lowest quintile. This suggests, therefore, that the behavioral response to the reform is either reducing benefits or increasing tax payments by more for the highest income quintiles. This affect appears to operate mostly through taxes: given that income taxes are progressive, longer work lives lead to a larger increase in tax payments over the life for higher income groups. That is, the longer work life in Table 5 relative to Table 4 leads to about $15,000 more in tax payments for the highest income quintile, but only $2500 more for the lowest income group.

In the actuarial adjustment reform, gains are small for all quintiles, though they are twice as large as a percent of base benefits (2.1% vs. 0.9%) for the highest quintile relative to the lowest.

In the common reform, by contrast, benefits are highly skewed towards the upper quintiles, even in percentage terms. This is because the common replaces the progressive benefit formula in the current system with a flat 60% replacement rate. The top quintile receives an increase in Social Security wealth net of all taxes equal to 61.6% of base benefits, while the bottom quintile receives an increase equal to just 4.7% of base benefits; results are similar in the model with shifts of the age dummy.

Part V: Conclusions

Any Social Security reform designed to improve the solvency of the OASDI trust funds will automatically have a beneficial effect on Social Security program finances by cutting benefits or raising taxes (the "mechanical" effect). But the reform may have an additional beneficial effect on program finances (the "behavioral" effect) if it encourages workers to retire later and if the Social Security system is less than actuarially fair. Even if there is no effect on program finances, the reform may have a beneficial effect on government finances if it leads workers to retire later and raises the lifetime income and consumption taxes they pay.

We have developed here a microsimulation model to estimate the impact of several reforms to the Social Security system. This model incorporates the behavioral responses of retirement to Social Security entitlements estimated in our earlier work. We have two key findings from this exercise. First, major reforms to the system can have substantial impacts on fiscal balances. Raising the early and normal retirement age by three years improves net fiscal balances by roughly one-third of baseline benefits. On the other hand, reducing the early retirement age to 60 and raising the replacement rate to 60% would lead to a deterioration of fiscal balances by over one-half of baseline benefits.

Second, behavioral responses to system reforms only contribute modestly to fiscal balance effects. This is because the Social Security system as a whole is roughly actuarially neutral. As a result, delaying retirement has little net impact on system finances. However, when other taxes are factored in, then delaying retirement does increase net government revenue. Thus, behavioral effects on the system as a whole are not zero, but they are dominated by the mechanical effects of reform.

References

Blau, David M. (1994). "Labor Force Dynamics of Older Men," Econometrica 62(1): 117-156.

Burtless, Gary (1986). "Social Security, Unanticipated Benefit Increases, and the Timing of Retirement," Review of Economic Statistics 53: 781-805.

Coile, Courtney and Jonathan Gruber (2003, forthcoming). "The Effect of Social Security on Retirement in the United States" (with Jonathan Gruber), in *Social Security and Retirement Around the World: Micro Estimation*, Jonathan Gruber and David A. Wise, eds. Chicago: University of Chicago Press, 2003.

Coile, Courtney and Jonathan Gruber (2001). "Social Security Incentives for Retirement," in Themes in the Economics of Aging, David Wise, ed. Chicago: University of Chicago Press.

Coile, Courtney and Jonathan Gruber (2000). "Social Security and Retirement," National Bureau of Economic Research Working Paper #7830.

Diamond, Peter and Jonathan Gruber (1998). "Social Security and Retirement in the United States," in Social Security and Retirement Around the World, Jonathan Gruber and David A. Wise, eds. Chicago: University of Chicago Press.

Diamond, Peter and Jerry Hausman (1984). "Retirement and Unemployment Behavior of Older Men," in Retirement and Economic Behavior, H. Aaron and G. Burtless, eds. Washington: Brookings Institution.

Fields, Gary S. and Olivia S. Mitchell (1984). "Economic Determinants of the Optimal Retirement Age: An Empirical Investigation," Journal of Human Resources 19(2): 245-262.

Gustman, Alan L and Thomas L. Steinmeier (1985). "The 1983 Social Security Reforms and Labor Supply Adjustments of Older Individuals in the Long Run," Journal of Labor Economics 3(2): 237-253.

Gustman, Alan L. and Thomas L. Steinmeier (1986). "A Structural Retirement Model," Econometrica 54(3): 555-584.

Hausman, Jerry A. and David A. Wise (1985). "Social Security, Health Status, and Retirement,"

in Pensions, Labor, and Individual Choice, David A. Wise, ed. Chicago: University of Chicago Press.

Hurd, Michael D. (1990). "Research on the Elderly: Economic Status, Retirement, and Consumption and Saving," Journal of Economic Literature 28(2): 565-637.

Ruhm, Christopher (1995). "Secular Changes in the Work and Retirement Patterns of Older Men," Journal of Human Resources 30: 362-385.

Rust, John and Christopher Phelan (1997). "How Social Security and Medicare Affect Retirement Behavior in a World of Incomplete Markets," Econometrica 65(4): 781-831.

Table 1: Retirement Probits

	Incentive Variable			
	Peak Value		Option Value	
	Age Dummies	Linear Age	Age Dummies	Linear Age
Male Sample				
SSW	0.1996	0.2926	0.1249	0.2010
	(0.1395)	(0.1344)	(0.1363)	(0.1331)
$10,000 Change	**[0.0016]**	**[0.0025]**	**[0.0010]**	**[0.0017]**
Incentive Measure	-0.6618	-0.4983	-0.2106	-0.2368
	(0.2750)	(0.2927)	(0.0522)	(0.0539)
$1,000 Change	**[-0.0005]**	**[-0.0004]**		
Pseudo R-squared	0.1386	0.1386	0.1402	0.1402
Female Sample				
SSW	0.2574	0.2881	0.2200	0.2485
	(0.1315)	(0.1320)	(0.1323)	(0.1331)
$10,000 Change	**[0.0020]**	**[0.0022]**	**[0.0017]**	**[0.0019]**
Incentive Measure	-0.0307	-0.0878	-0.2441	-0.2723
	(0.3350)	(0.3345)	(0.0753)	(0.0773)
$1,000 Change	**[-0.00002]**	**[-0.00007]**		
Pseudo R-squared	0.1530	0.1530	0.1530	0.1549

Notes:
(1) Dependent variable is whether the individual retires this year.
(2) PV and SSW are in 100,000s of $1992; OV is /10,000.
(2) Regressions include controls for education, race, experience, marital status, industry, occupation, region, year, as well as a quartic in earnings, a quartic in lifetime earnings, and the interactions of these quartics (plus same earnings variables for the spouse).

Table 2: Total Fiscal Impact of Reform for Average Age-55 Household

	Base	Increase ERA/NRA	Actuarial Adjustment	Common Reform	Total Change Relative to Base ERA/NRA	Act. Adj.	Common
Peak Value, Linear Age							
Benefits	196,503	160,526	198,763	282,264	-18.3%	1.1%	43.6%
Taxes: Payroll	58,681	61,362	58,089	57,305	4.6%	-1.0%	-2.3%
Taxes: Income	86,288	88,000	85,588	90,839	2.0%	-0.8%	5.3%
Taxes: Consumption	35,221	34,622	35,155	39,895	-1.7%	-0.2%	13.3%
Taxes: Total	180,191	183,983	178,832	188,038	2.1%	-0.8%	4.4%
Peak Value, Age Dummies (No Shift)							
Benefits	193,947	158,400	196,232	282,445	-18.3%	1.2%	45.6%
Taxes: Payroll	60,419	62,396	59,768	62,054	3.3%	-1.1%	2.7%
Taxes: Income	87,808	88,595	87,038	96,551	0.9%	-0.9%	10.0%
Taxes: Consumption	35,504	34,708	35,428	40,981	-2.2%	-0.2%	15.4%
Taxes: Total	183,731	185,700	182,234	199,585	1.1%	-0.8%	8.6%
Peak Value, Age Dummies (With Shift)							
Benefits	193,947	159,678	196,232	279,771	-17.7%	1.2%	44.3%
Taxes: Payroll	60,419	66,820	59,768	59,939	10.6%	-1.1%	-0.8%
Taxes: Income	87,808	93,859	87,038	93,800	6.9%	-0.9%	6.8%
Taxes: Consumption	35,504	35,994	35,428	40,312	1.4%	-0.2%	13.5%
Taxes: Total	183,731	196,672	182,234	194,051	7.0%	-0.8%	5.6%
Option Value, Linear Age							
Benefits	196,839	160,914	199,110	280,870	-18.3%	1.2%	42.7%
Taxes: Payroll	59,763	62,297	59,393	57,012	4.2%	-0.6%	-4.6%
Taxes: Income	87,591	89,149	87,181	89,971	1.8%	-0.5%	2.7%
Taxes: Consumption	35,546	34,938	35,540	39,741	-1.7%	0.0%	11.8%
Taxes: Total	182,901	186,383	182,114	186,724	1.9%	-0.4%	2.1%
Option Value, Age Dummies (No Shift)							
Benefits	194,153	158,791	196,436	279,323	-18.2%	1.2%	43.9%
Taxes: Payroll	61,229	63,180	60,918	59,638	3.2%	-0.5%	-2.6%
Taxes: Income	88,766	89,580	88,438	92,940	0.9%	-0.4%	4.7%
Taxes: Consumption	35,751	34,987	35,766	40,280	-2.1%	0.0%	12.7%
Taxes: Total	185,746	187,747	185,122	192,857	1.1%	-0.3%	3.8%
Option Value, Age Dummies (With Shift)							
Benefits	194,153	160,208	196,436	276,407	-17.5%	1.2%	42.4%
Taxes: Payroll	61,229	66,541	60,918	57,446	8.7%	-0.5%	-6.2%
Taxes: Income	88,766	93,697	88,438	89,997	5.6%	-0.4%	1.4%
Taxes: Consumption	35,751	36,004	35,766	39,579	0.7%	0.0%	10.7%
Taxes: Total	185,746	196,243	185,122	187,022	5.7%	-0.3%	0.7%

Notes: Results are in 2001 Euros.

Table 3: Decomposition of the Total Effect of Reform

	Change in PDV								
	Increase ERA/NRA			Acturial Adjustment			Common Reform		
	Mechanical	Behavioral	Total	Mechanical	Behavioral	Total	Mechanical	Behavioral	Total
Peak Value, Linear Age									
Benefits	-35,934	-44	-35,978	2,405	-146	2,260	84,312	1,449	85,761
Taxes: Total	-2,706	6,499	3,793	199	-1,558	-1,359	11,119	-3,272	7,848
Net Change	-33,228	-6,543	-39,770	2,207	1,412	3,619	73,192	4,721	77,913
Change as % Base Benefits	-24.0%	-4.7%	-28.8%	1.6%	1.0%	2.6%	53.0%	3.4%	56.4%
Peak Value, Age Dummies (No Shift)									
Benefits	-35,146	-401	-35,547	2,314	-30	2,285	83,779	4,718	88,498
Taxes: Total	-2,658	4,627	1,969	196	-1,693	-1,497	11,023	4,831	15,854
Net Change	-32,488	-5,028	-37,516	2,118	1,663	3,781	72,756	-113	72,643
Change as % Base Benefits	-23.8%	-3.7%	-27.5%	1.6%	1.2%	2.8%	53.3%	-0.1%	53.3%
Peak Value, Age Dummies (With Shift)									
Benefits	-35,146	876	-34,270	2,314	-30	2,285	83,779	2,044	85,824
Taxes: Total	-2,658	15,599	12,941	196	-1,693	-1,497	11,023	-703	10,320
Net Change	-32,488	-14,723	-47,211	2,118	1,663	3,781	72,756	2,748	75,504
Change as % Base Benefits	-23.8%	-10.8%	-34.6%	1.6%	1.2%	2.8%	53.3%	2.0%	55.4%
Option Value, Linear Age									
Benefits	-36,031	106	-35,925	2,344	-73	2,270	85,119	-1,088	84,031
Taxes: Total	-2,724	6,206	3,482	196	-983	-787	11,269	-7,446	3,823
Net Change	-33,308	-6,100	-39,408	2,147	910	3,058	73,850	6,358	80,208
Change as % Base Benefits	-24.1%	-4.4%	-28.5%	1.6%	0.7%	2.2%	53.3%	4.6%	57.9%
Option Value, Age Dummies (No Shift)									
Benefits	-35,193	-169	-35,362	2,283	0	2,283	84,398	773	85,171
Taxes: Total	-2,672	4,673	2,000	194	-818	-624	11,139	-4,028	7,111
Net Change	-32,521	-4,841	-37,362	2,090	818	2,908	73,259	4,800	78,060
Change as % Base Benefits	-23.8%	-3.5%	-27.4%	1.5%	0.6%	2.1%	53.6%	3.5%	57.2%
Option Value, Age Dummies (With Shift)									
Benefits	-35,193	1,249	-33,945	2,283	0	2,283	84,398	-2,144	82,254
Taxes: Total	-2,672	13,168	10,496	194	-818	-624	11,139	-9,862	1,276
Net Change	-32,521	-11,920	-44,441	2,090	818	2,908	73,259	7,719	80,978
Change as % Base Benefits	-23.8%	-8.7%	-32.5%	1.5%	0.6%	2.1%	53.6%	5.7%	59.3%

Note: Results are in 2001 Euros

Table 4: Distribution Analysis, Optional Value -- Age Dummies (No Shift)

Case	PDV				Change Relative to Base PDV		
	Base	ERA/ NRA	Act. Adj.	Common Reform	ERA/ NRA	Act. Adj.	Common Reform
			Quintile 1 (highest)				
Benefits	255,230	207,917	258,921	423,651	-47,313	3,691	168,421
Taxes: Total	340,597	343,794	338,887	351,741	3,198	-1,710	11,144
Net Change					-50,511	5,401	157,277
Change as a % of Base Benefits					-19.8%	2.1%	61.6%
			Quintile 2				
Benefits	225,141	184,077	227,998	338,720	-41,064	2,857	113,579
Taxes: Total	220,492	223,587	219,668	230,430	3,096	-823	9,938
Net Change					-44,160	3,680	103,641
Change as a % of Base Benefits					-19.6%	1.6%	46.0%
			Quintile 3				
Benefits	204,245	166,976	206,409	290,404	-37,269	2,164	86,159
Taxes: Total	165,641	168,244	165,274	173,308	2,603	-367	7,667
Net Change					-39,872	2,531	78,492
Change as a % of Base Benefits					-19.5%	1.2%	38.4%
			Quintile 4				
Benefits	173,991	142,668	175,695	224,095	-31,323	1,704	50,104
Taxes: Total	118,946	120,067	118,760	123,692	1,121	-185	4,746
Net Change					-32,444	1,889	45,358
Change as a % of Base Benefits					-18.6%	1.1%	26.1%
			Quintile 5				
Benefits	111,923	92,125	112,919	119,248	-19,798	996	7,325
Taxes: Total	82,635	82,614	82,600	84,680	-21	-35	2,045
Net Change					-19,777	1,031	5,280
Change as a % of Base Benefits					-17.7%	0.9%	4.7%

Note: Results are in 2001 Euros.

Table 5: Distribution Analysis, Optional Value -- Age Dummies (With Shift)

Case	PDV				Change Relative to Base PDV		
	Base	ERA/ NRA	Act. Adj.	Common Reform	ERA/ NRA	Act. Adj.	Common Reform
			Quintile 1 (highest)				
Benefits	255,230	209,460	258,921	419,153	-45,770	3,691	163,923
Taxes: Total	340,597	359,191	338,887	340,770	18,594	-1,710	173
Net Change					-64,365	5,401	163,750
Change as a % of Base Benefits					-25.2%	2.1%	64.2%
			Quintile 2				
Benefits	225,141	185,717	227,998	334,951	-39,424	2,857	109,810
Taxes: Total	220,492	234,757	219,668	222,802	14,266	-823	2,311
Net Change					-53,690	3,680	107,499
Change as a % of Base Benefits					-23.8%	1.6%	47.7%
			Quintile 3				
Benefits	204,245	168,531	206,409	287,310	-35,713	2,164	83,065
Taxes: Total	165,641	176,672	165,274	167,628	11,030	-367	1,987
Net Change					-46,743	2,531	81,079
Change as a % of Base Benefits					-22.9%	1.2%	39.7%
			Quintile 4				
Benefits	173,991	143,909	175,695	222,102	-30,082	1,704	48,112
Taxes: Total	118,946	125,010	118,760	120,400	6,064	-185	1,455
Net Change					-36,146	1,889	46,657
Change as a % of Base Benefits					-20.8%	1.1%	26.8%
			Quintile 5				
Benefits	111,923	93,233	112,919	118,026	-18,690	996	6,103
Taxes: Total	82,635	85,135	82,600	83,091	2,500	-35	456
Net Change					-21,190	1,031	5,647
Change as a % of Base Benefits					-18.9%	0.9%	5.0%

Note: Results are in 2001 Euros

Figure 1: Social Security Benefits by Age of Labor Force Exit, Three-Year Reform

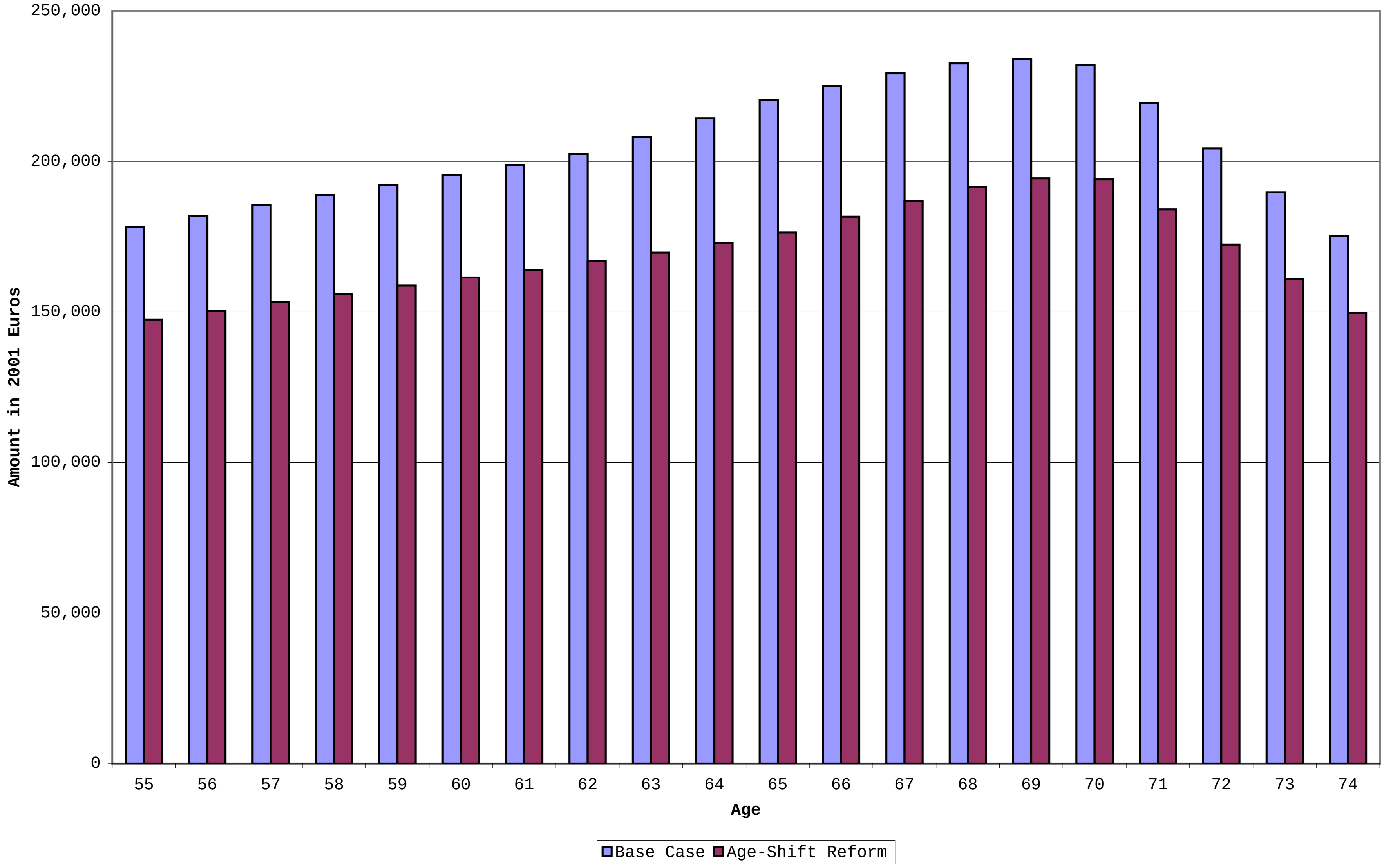


Figure 2: Total Taxes by Age of Labor Force Exit, Three-Year Reform

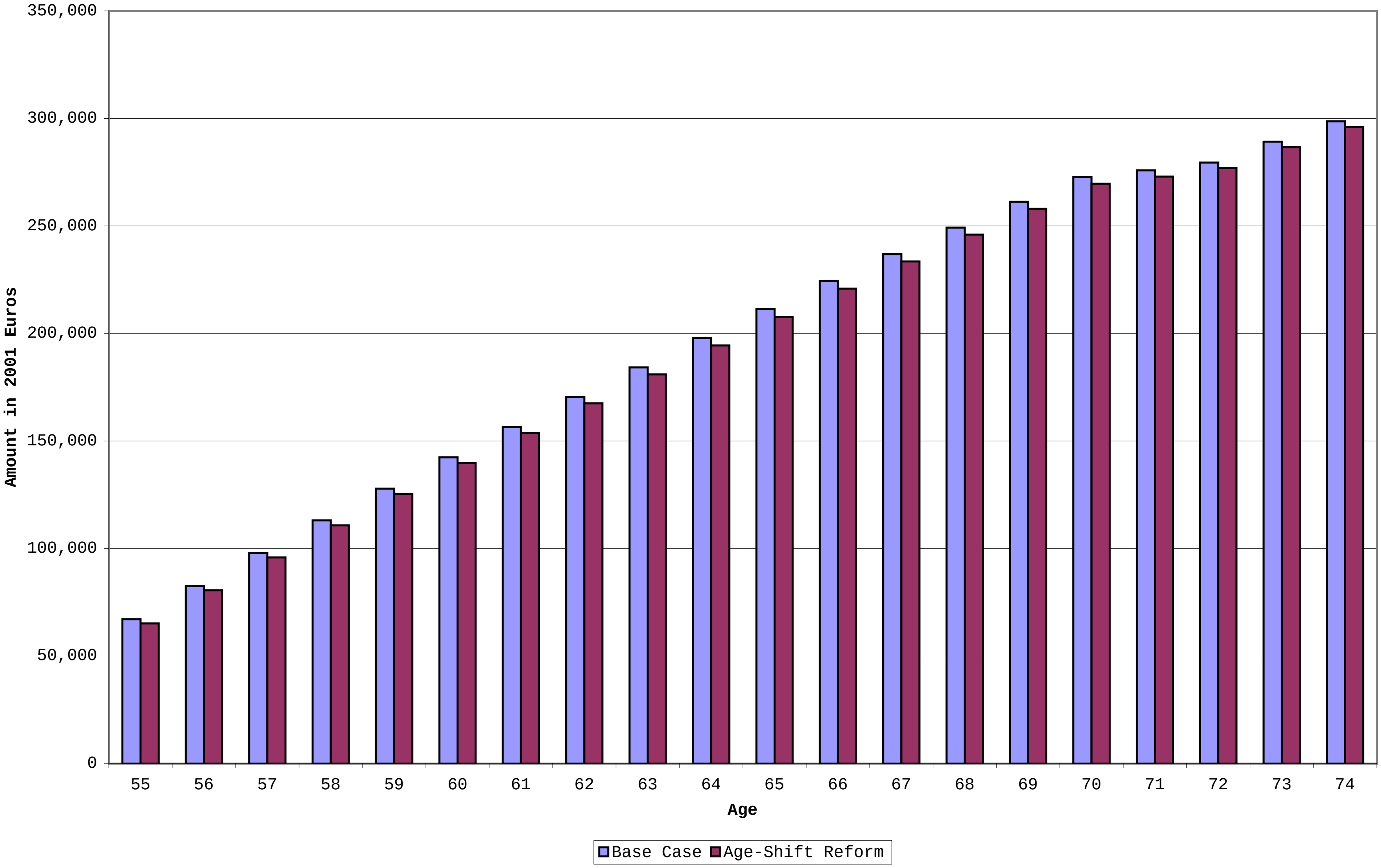


Figure 3: Distribution of Retirement Ages, Three-Year Reform, Option Value -- Age Dummies (No Shift)

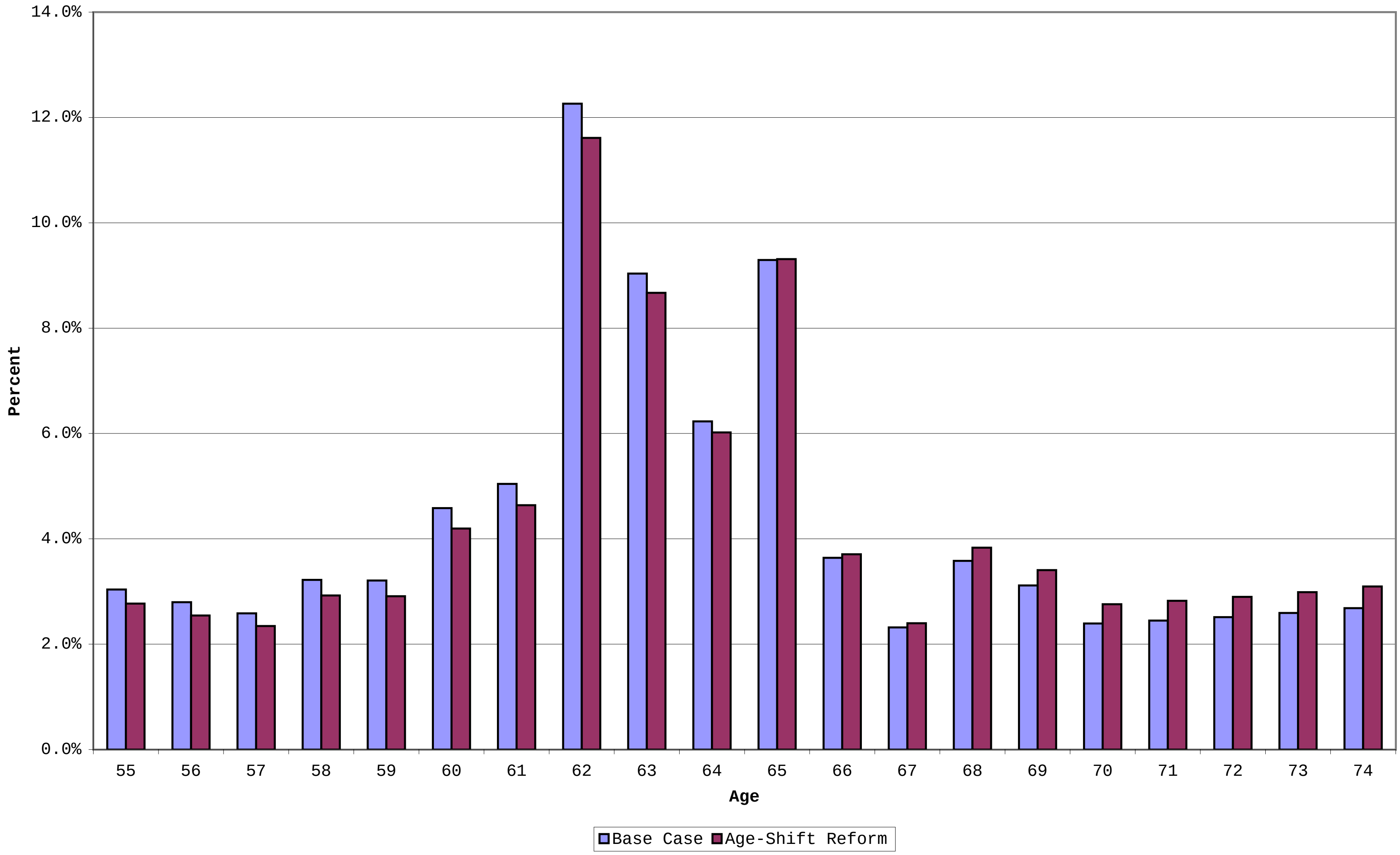


Figure 4: Total Effect by Age of Retirement, Three-Year Reform, Option Value -- Age Dummies (No Shift)

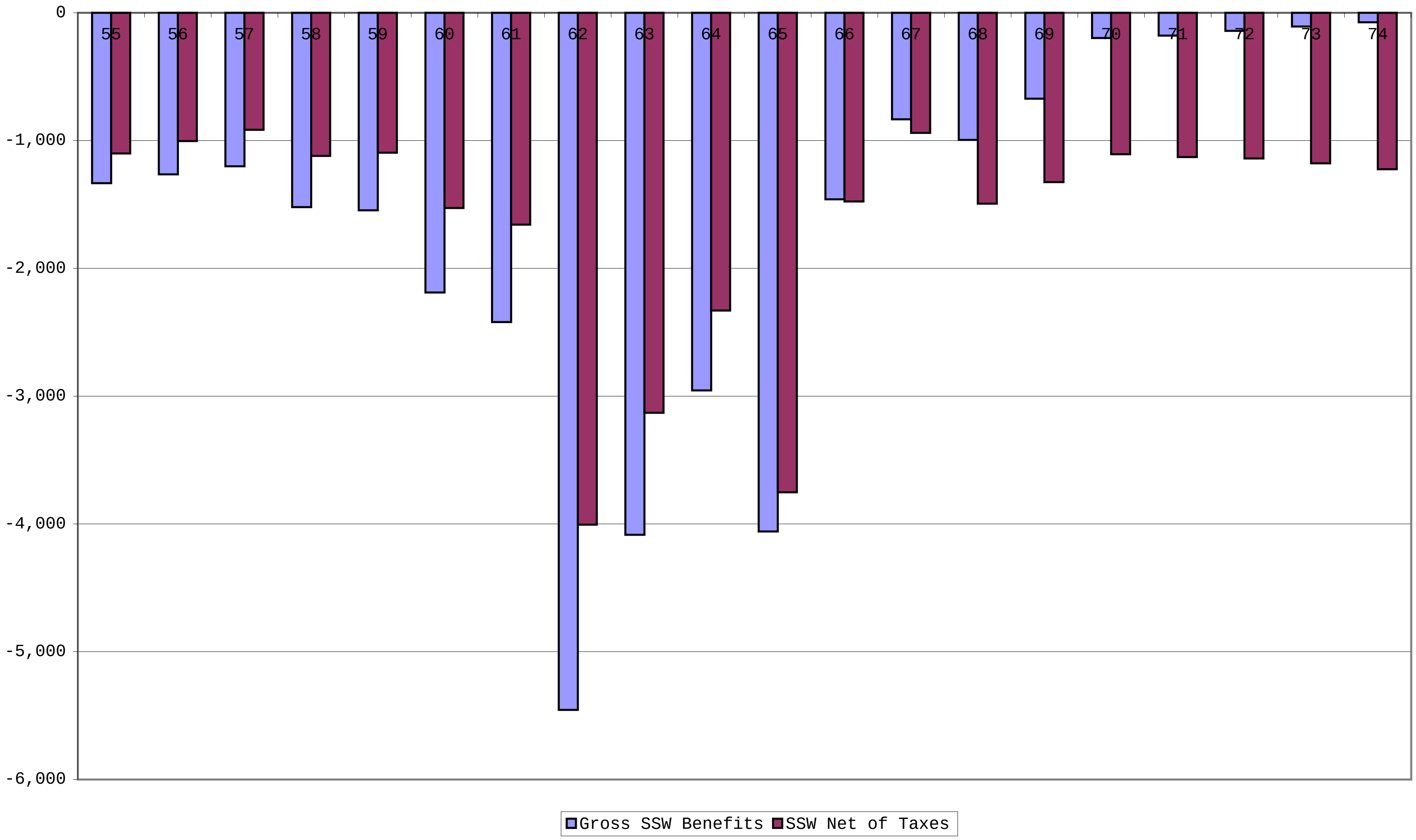


Figure 5: Distribution of Retirement Ages, Three-Year Reform, Option Value -- Age Dummies (With Shift)

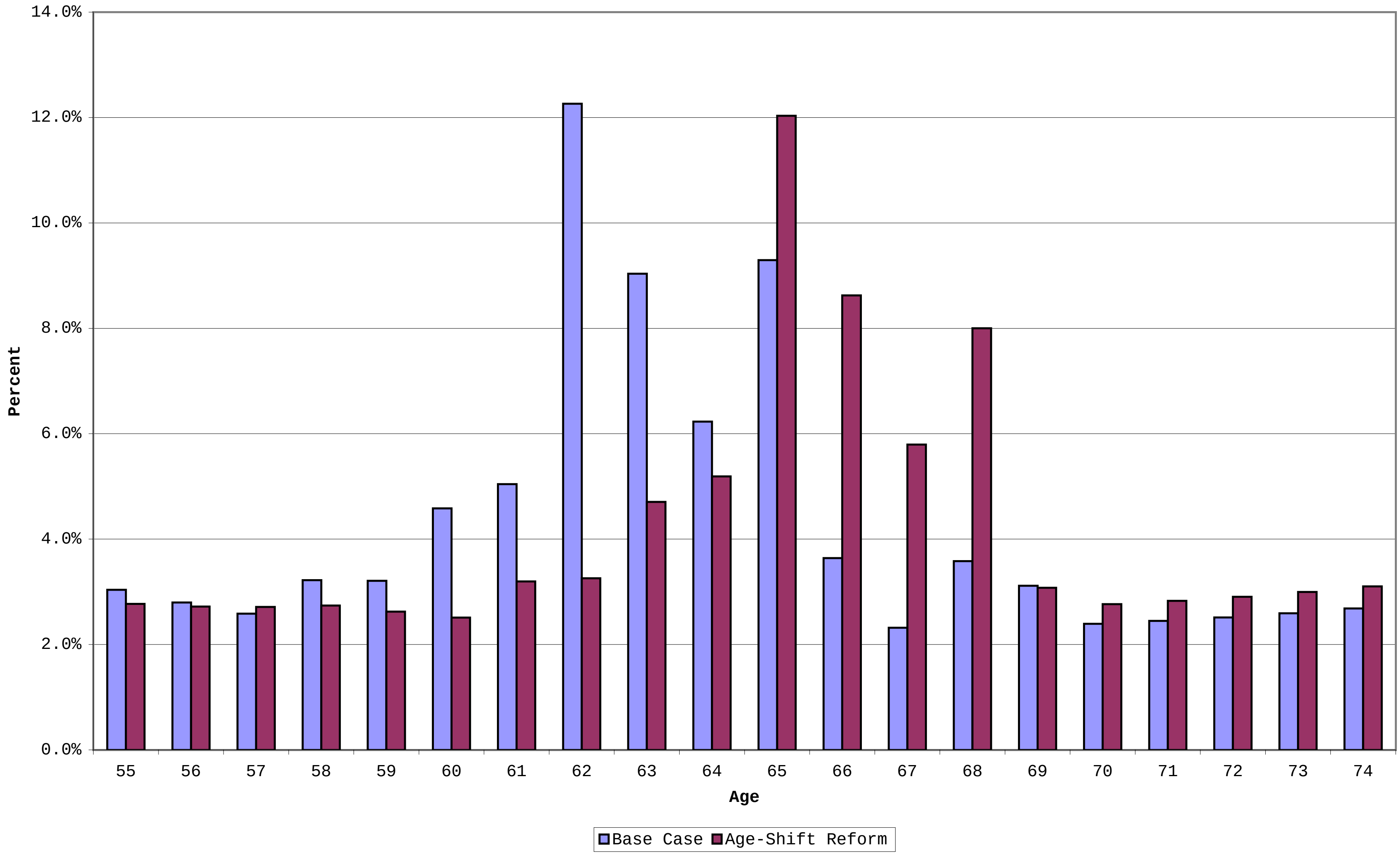


Figure 6: Total Effect by Age of Retirement, Three-Year Reform, Option Value -- Age Dummies (With Shift)

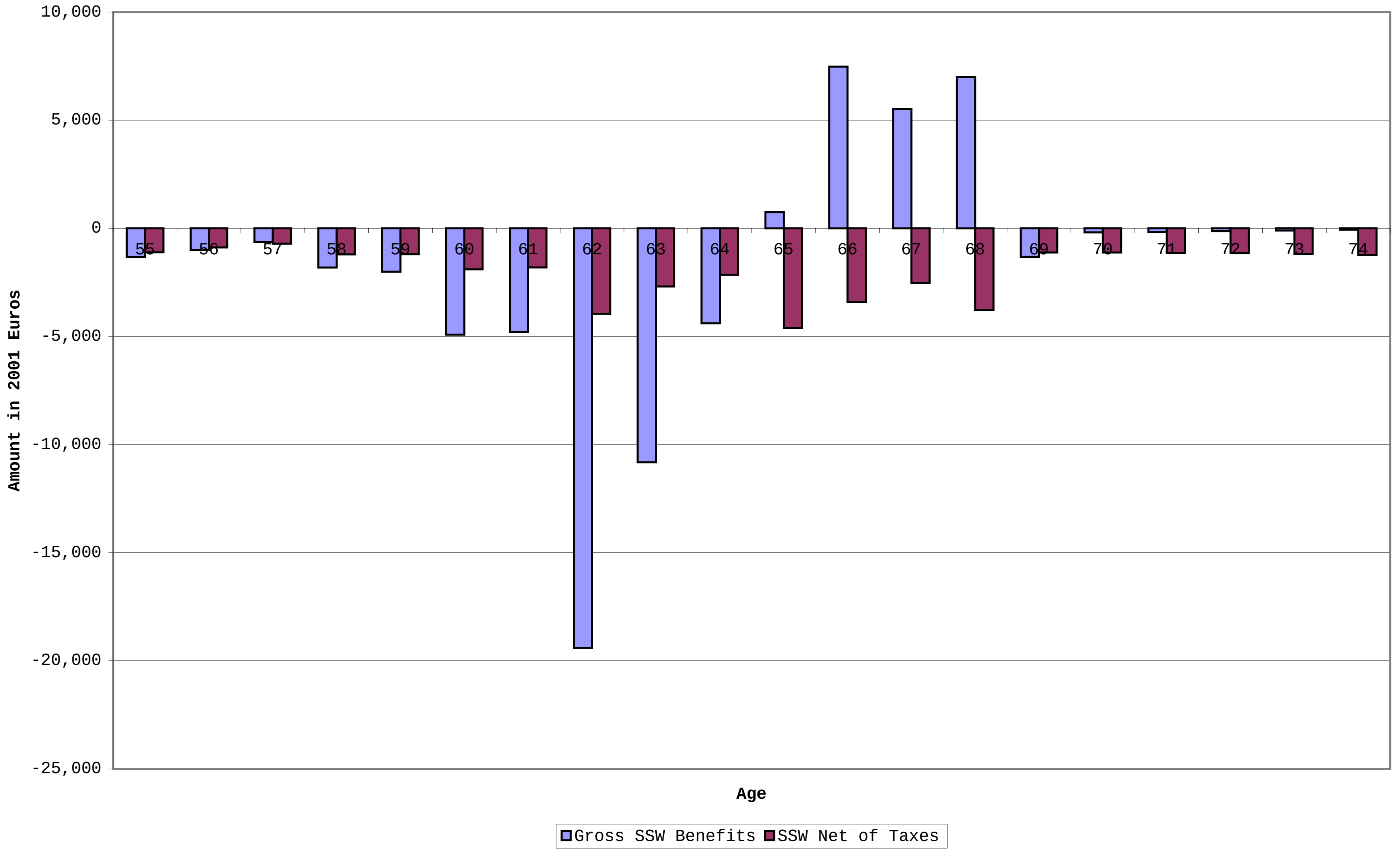


Figure 7: Fiscal Implications of Reform as a Percent of GDP: Three-Year Reform

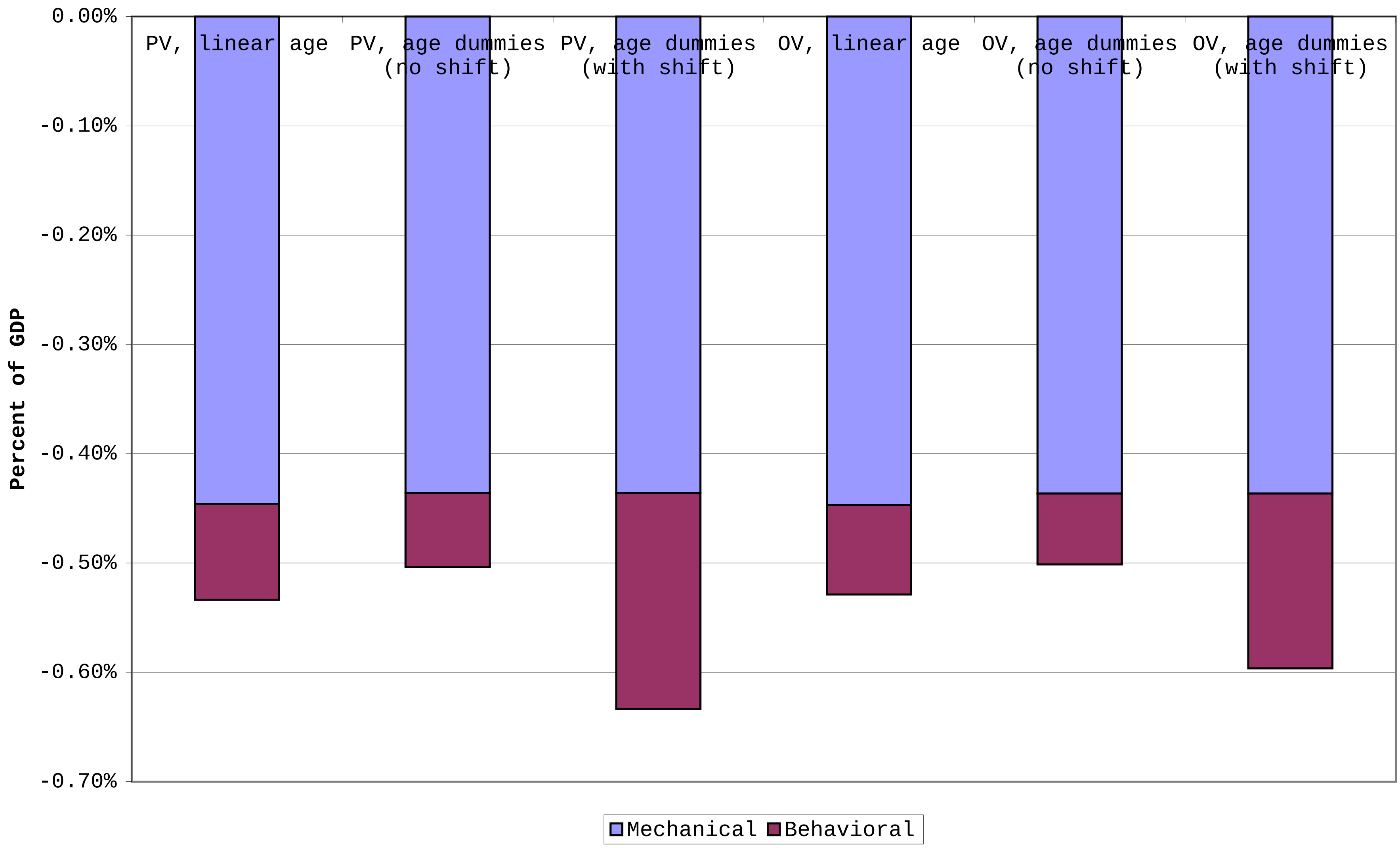


Figure 8: Social Security Benefits by Age of Labor Force Exit, Actuarial Adjustment Reform

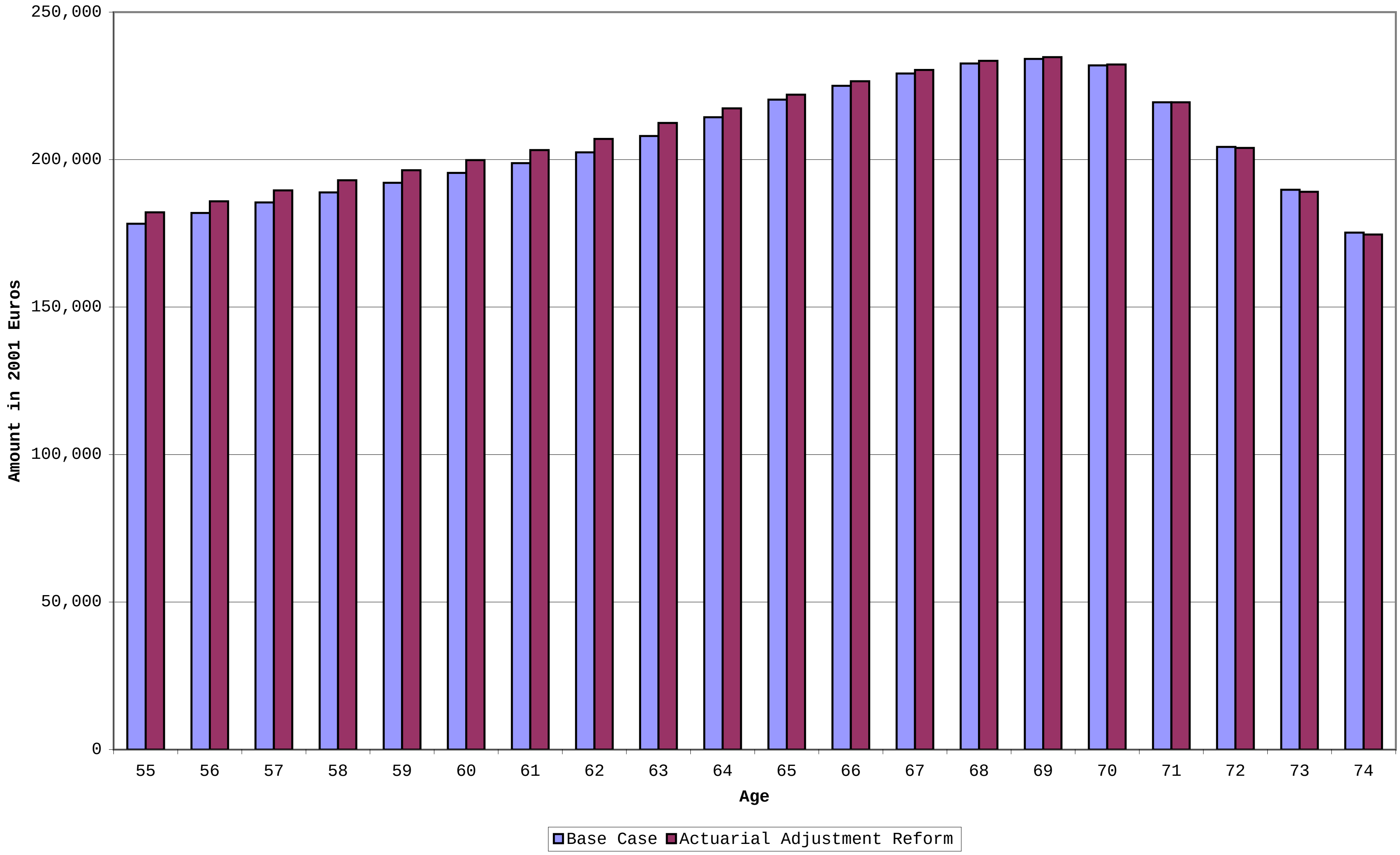


Figure 9: Distribution of Retirement Ages, Common Reform, Option Value -- Age Dummies (No Shift)

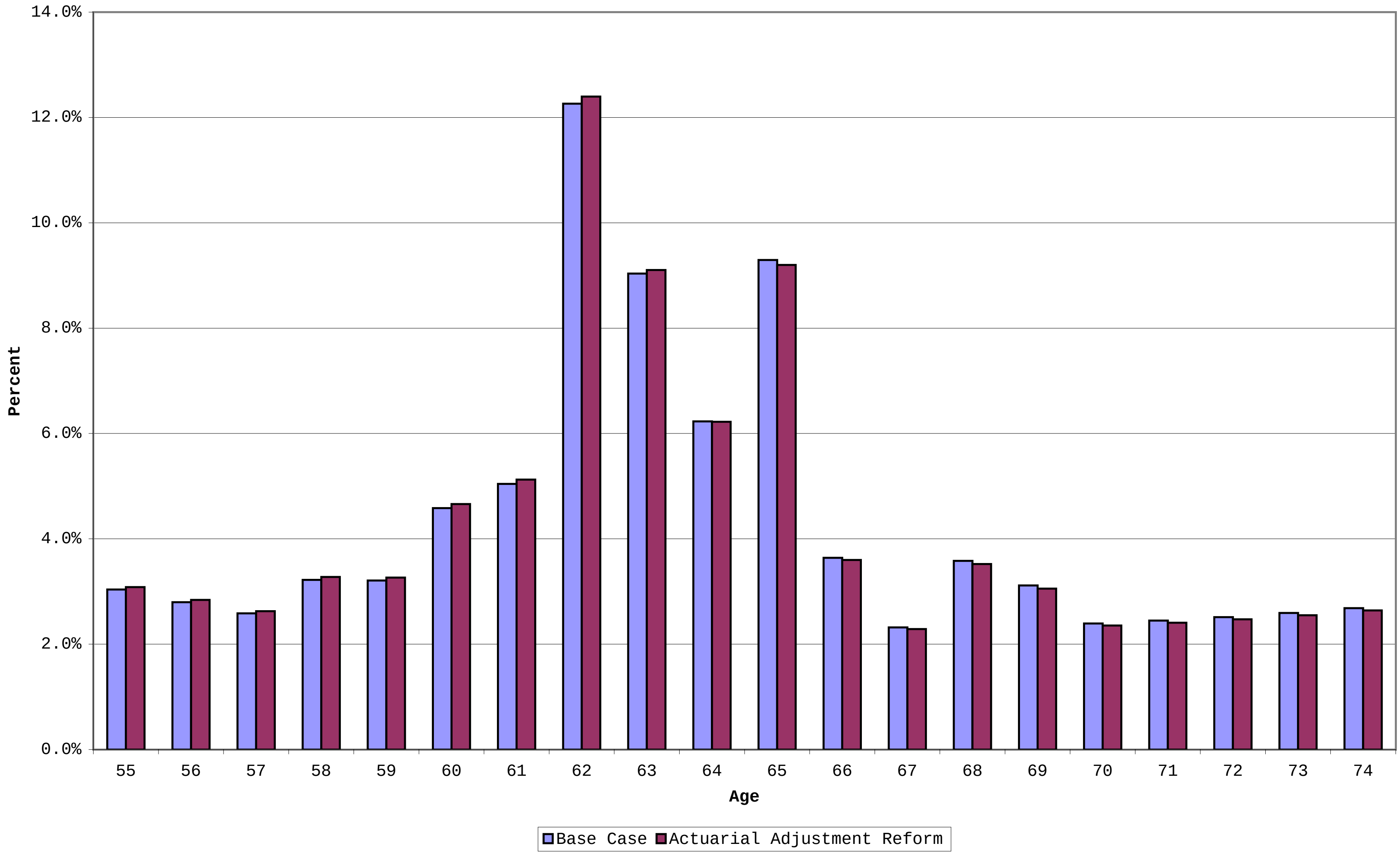


Figure 10: Fiscal Implications of Reform as a Percent of GDP: Actuarial Adjustment Reform

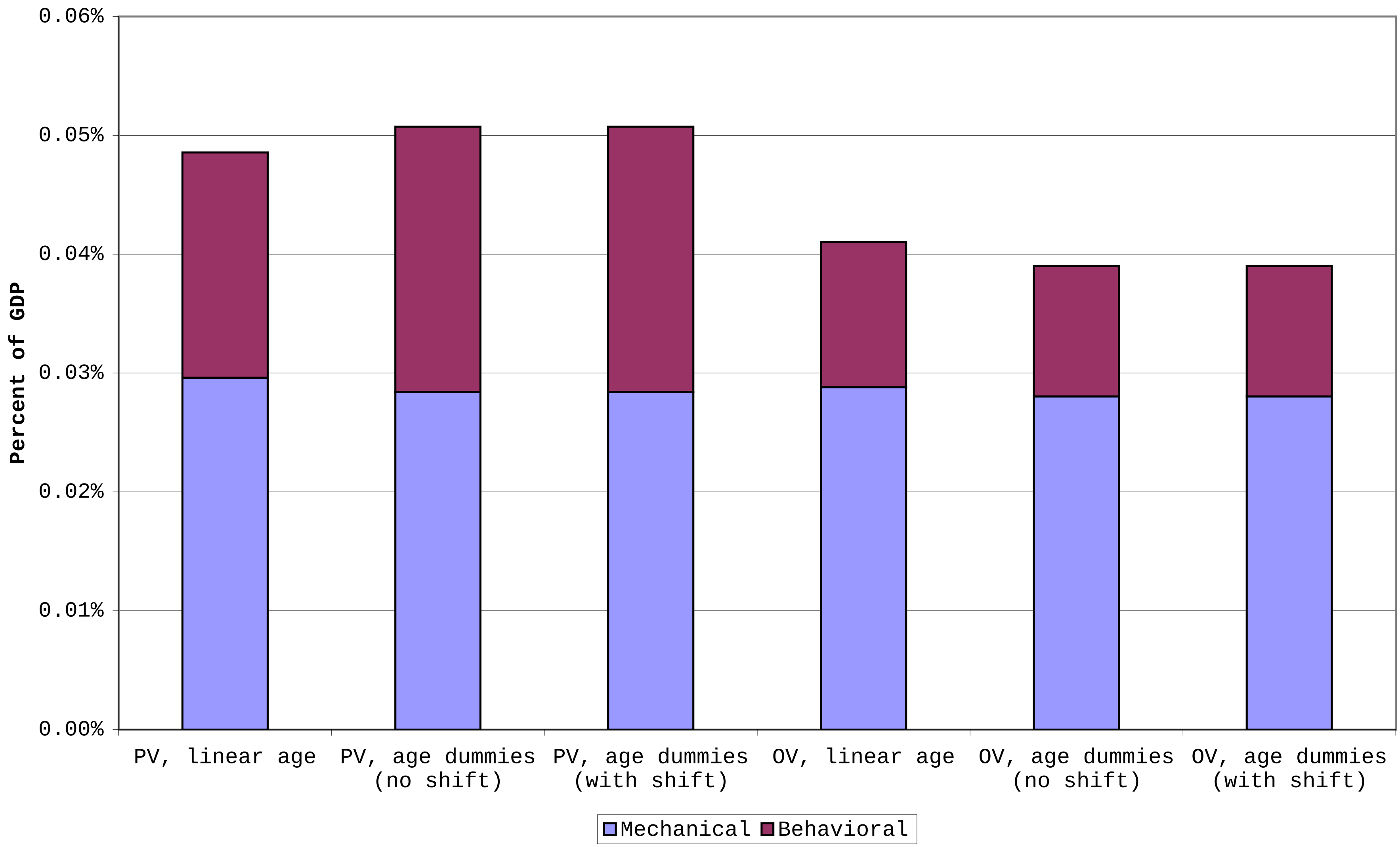


Figure 11: Social Security Benefits by Age of Labor Force Exit, Common Reform

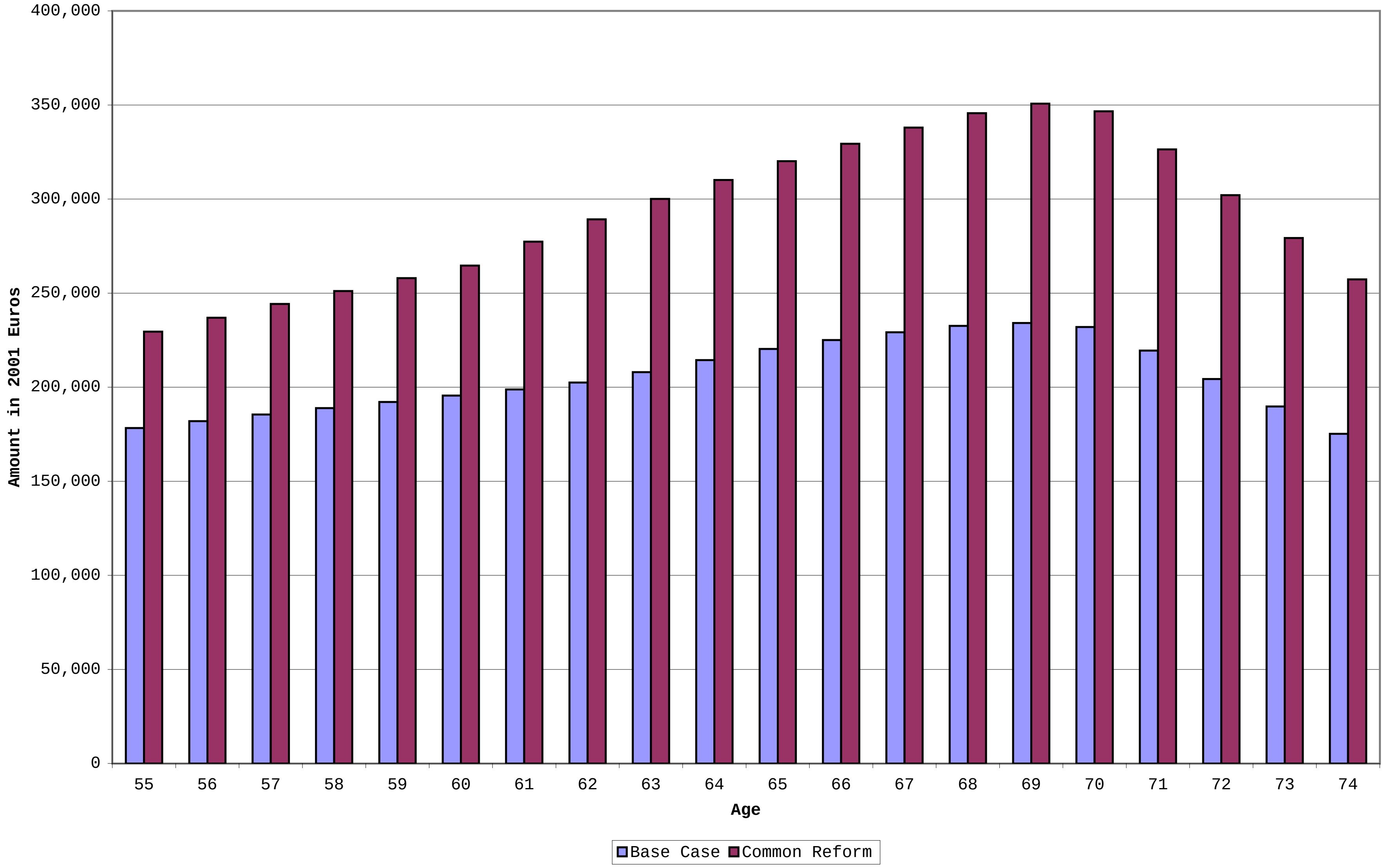
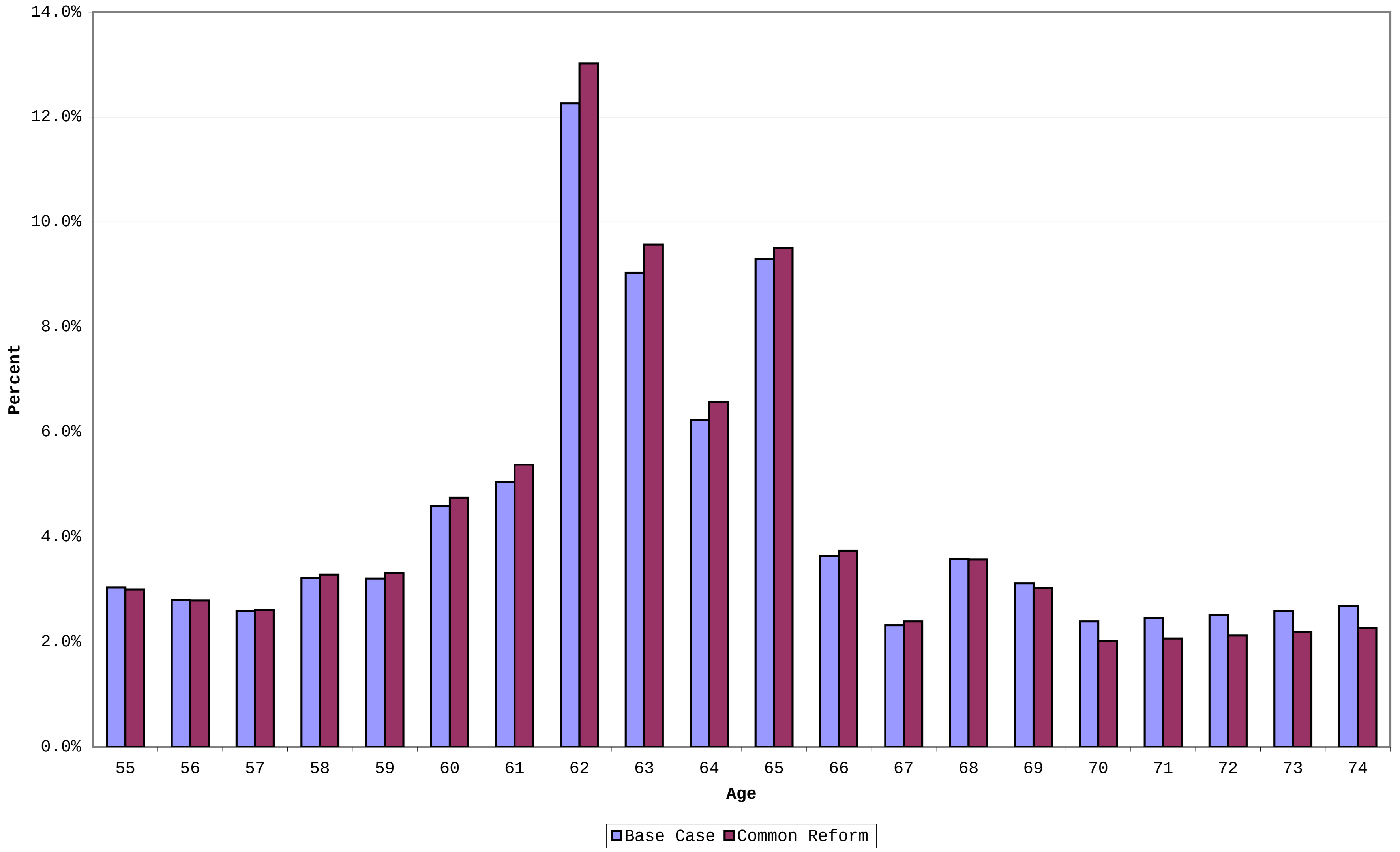


Figure 12: Distribution of Retirement Ages, Common Reform, Option Value -- Age Dummies (No Shift)



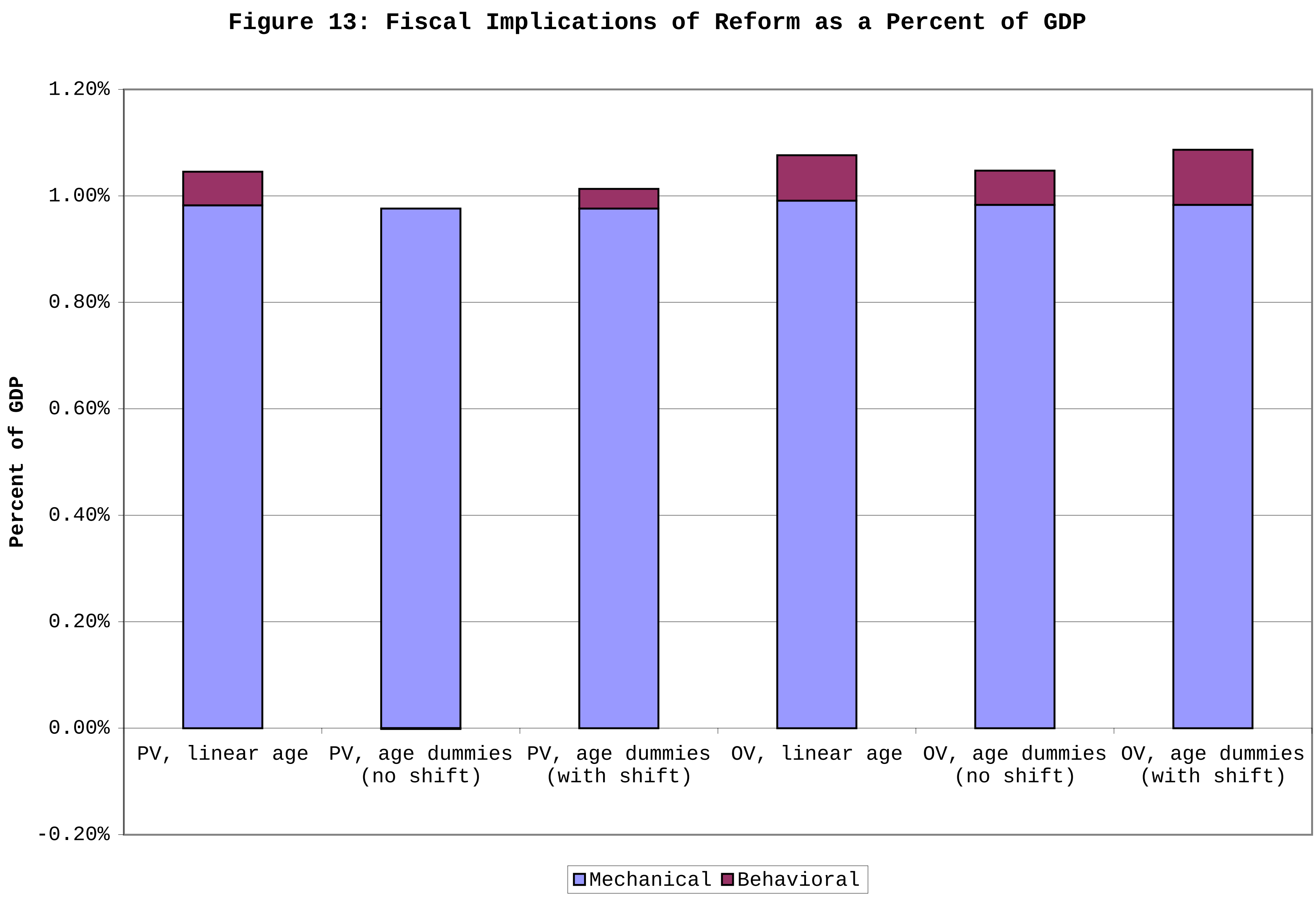


Figure 13: Fiscal Implications of Reform as a Percent of GDP
Percent of GDP
1.20%
1.00%
0.80%
0.60%
0.40%
0.20%
0.00%
-0.20%
PV, linear age
PV, age dummies (no shift)
PV, age dummies (with shift)
OV, linear age
OV, age dummies (no shift)
OV, age dummies (with shift)
Mechanical
Behavioral

Recent Working Papers from the Center for Retirement Research at Boston College

Implications of the Bush Commission Pension Reforms for Married Couples
Barry Bosworth, Gary Burtless, Benjamin Keys, February 2003

Young Widow(er)s, Social Security, and Marriage
Michael J. Brien, Stacy Dickert-Colin, and David A. Weaver, February 2003

The Role of Marital History, Early Retirement Benefits, and the Economic Status of Women
Tay K. NcNamara, Regina O'Grady-Leshane, and John B. Williamson, January 2003

Job Search Behavior at the End of the Life Cycle
Hugo Benitez-Silva, December 2002

Forecasting Incidence of Work Limitations, Disability Insurance Receipt, And Mortality in Dynamic Simulation Models Using Social Security Administrative Records: A Research Note
Melissa Favreault, December 2002

Medicare, Retirement Costs, and Labor Supply at Older Ages
Richard W. Johnson, December 2002

The Rise in Disability Recipiency and the Decline in Unemployment
David H. Autor and Mark G. Duggan, September 2002

Disability and Employment: Reevaluating the Evidence in Light of Reporting Errors
Brent Krieder and John V. Pepper, September 2002

The Effect of Unplanned Changes in Marital and Disability Status: Interrupted Trajectories and Labor Force Participation
John B. Williamson and Tay K. McNamara, September 2002

Health Insurance and the Disability Insurance Application Decision
Jonathan Gruber and Jeffrey Kubik, September 2002

Projecting Poverty Rates in 2020 for the 62 and Older Population: What Changes Can We Expect and Why?
Barbara A. Butrica, Karen Smith, and Eric Toder, September 2002

Social Security and the Private Pension System: The Significance of Integrated Plans
Pamela Perun, July 2002