Distributional Impact of Social Security Reforms: Summary

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1. Introduction

The United States, along with most other industrial countries, is debating how to modify public retirement programs in response to population aging. The debate has identified three broad approaches to reform: Increasing contribution rates; reducing benefits; and pre-funding a larger fraction of future obligations. Opinions about these approaches differ because the options have differing distributional impacts, both on high- and low-wage workers within a cohort and across age cohorts. The debate over the first two policy options is dominated by distributional concerns. Boosting contribution rates will favor workers who are already retired or near retirement; reducing benefits hurts people who are retired or near retirement. The policy choice between the two options is viewed from the perspective of a zero-sum conflict in which the benefits or taxes of one generation or group of workers must be sacrificed in the interest of maintaining the incomes of another. The total amount of future resources available for consumption is assumed fixed, and the debate is over how to divide them between workers and retirees and between high- and low-wage workers.

From an economic perspective, the option of advance funding offers a different kind of choice. The pool of resources for future consumption cannot be assumed to remain constant. It can rise or fall depending on today's choice of an advance funding policy. Current workers can fund a greater part of the cost of their own pensions by increasing their contributions into a retirement plan, whether the plan is public or private. If the contributions are saved and used to finance the accumulation of additional capital, the result will be an expansion of the resources available to future workers and retirees.

In this paper we examine the distributional consequences of three alternative approaches to pension reform within a model that takes account of the dynamic effects of the reforms on aggregate output, wages, and interest rates. This framework allows us to measure the feedback effects of advance funding on workers' earnings and pension benefits. These dynamic effects are sufficiently large so that they fundamentally change the conclusions we would draw based on a static analysis. Our analysis is performed by combining a neoclassical growth model with a microsimulation model. This combination permits us to measure the impact of alternative reforms on a representative set of individual workers. The microeconomic model is based on a small number of earnings patterns that reflect the diverse career wage profiles of recent

American workers. The profiles allow us to calculate individual pension benefits, lifetime net incomes, and internal rates of return and thus to examine the distributional impact of reform.

We focus on three alternative reforms that would restore Social Security to solvency: (1) Future tax increases that maintain the Social Security system on a pay-as-you-go basis (i.e., each year's income exactly covers the year's expenses while maintaining a reserve equal to one year's outgo); (2) Tax increases that maintain the system in actuarial balance over a 75-year horizon (a reform that requires a sizable *immediate* tax increase)[1]; and (3) Benefit reductions that maintain solvency on a pay-as-you-go basis combined with a new mandatory system of individual pension accounts that partially offset the cuts in Social Security benefits. We have designed the second and third reforms so that both require workers to contribute an additional 2.6 percentage points of taxable wages to the retirement system starting in 2000. Under the second reform, the extra contributions flow into the Social Security Trust Funds. Under the third reform, they flow into private retirement accounts in which 70 percent of accumulations are held as equities and 30 percent are held as government bonds.[2]

2. Static Analysis

In the first part of the analysis we use the macroeconomic model and a Trust Fund accounting model to calculate the size of Social Security tax increases and benefit cuts needed to keep the system solvent. Crucial statistics about the future economy and population are derived from the intermediate economic and demographic assumptions of the *1996 Old-Age, Survivors, and Disability Insurance (OASDI) Trustees' Report*. Others are generated by a standard neoclassical growth model. The microsimulation model consists of a set of stylized age-earnings profiles and algorithms for calculating the earnings, taxes, and retirement benefits of individual workers under each of the policy alternatives. The individual profiles are directly linked to predictions from the macroeconomic module. Each worker's annual earnings at a given age can be expressed as a percentage of the economy-wide average wage. In the baseline simulation, we

[1] This option is the same as that proposed in Aaron, Bosworth, and Burtless, *Can America Afford to Grow Old? Paying for Social Security* (Brookings, 1989). The plan avoids some of the transitional problems of a shift away from pay-as-you-go financing by seeking only to pre-fund additions to the current cost burden. The 75-year horizon is the longest planning horizon used in the Trustees' Reports. Using a horizon of 25 years or less, the initial tax increase in 2000 and the Trust Fund buildup would be much smaller.

[2] The bond rate is the same as assumed in the Trustees' Report, and we assume an equity risk premium of about 5 percent. At age 62, the accounts are converted to a fixed, real annuity using the riskless rate on government bonds.

assume that future economy-wide wages follow the path predicted in the *1996 OASDI Trustees' Report*.

2.1 Age-Earnings Profiles.

Individuals are classified into nine categories defined on the basis of their career-average earnings (low, middle, or high) and the trend in their age-earnings profile (declining, level, and rising). For purposes of calculating workers' retirement benefits under the current Social Security formula, it is enough to know the average level of their career wages (specifically, the highest 35 years of indexed earnings). In contrast, the trend or time path of earnings has a large impact on benefits under a defined-contribution (DC) pension plan. Contributions into a DC account in the early years of a worker's career earn investment returns over a longer period, providing a larger pension per dollar contributed than contributions made late in the career. The stylized earnings profiles were estimated using the 1990-1993 Survey of Income and Program Participation (SIPP) panels matched to Social Security earnings records (SSER).[3]

The nine age-earnings profiles are displayed in Figure 1. Note the wide diversity of earnings patterns. As many individuals have a declining trend as a rising trend in career earnings. These representations of low, middle, and high earners imply significantly lower career-average earnings than the traditional stylized earnings patterns assumed by the Social Security Administration.[4] Workers in the bottom third of the earnings distribution have an average wage less than half the low-wage value used by the SSA, and the median earnings of workers in the middle- and high-earnings groups are about two-thirds of assumed earnings in the equivalent SSA average- and high-wage profiles.

2.2 Alternative Solvency Rules

The top panel of Figure 2 shows the size and timing of tax increases needed to preserve Social Security solvency under the first two policy options; the lower panel shows the required benefit cuts needed to preserve solvency under the third reform option. The pay-go test under

[3] Further details about the data set are provided in Toder et al., *Modeling Income in the Near Term – Projections of Retirement Income* (Urban Institute, 1999, especially chapters 2 and 8). See also Bosworth, Burtless, and Steuerle, "Lifetime Earnings Patterns, the Distribution of Future Social Security Benefits, and the Impact of Pension Reform," (Brookings and Urban Institute, 1999) and Bosworth and Burtless, "The Effects of Social Security Reform on Saving, Investment, and the Level and Distribution of Worker Well-Being" (Brookings, 2000).

[4] The standard SSA earnings patterns assume that workers earn the maximum taxable wage in every year, the economy-wide average wage, or 45 percent of the average wage. In contrast, we use an average of actual earnings experiences, which includes workers' years of zero earnings.

option #1 first fails in 2024. Between 2024 and 2034, the Social Security tax rate must increase from 12.4 percentage points to 16.6 percentage points under that option. The key point is that the cost of restoring Social Security solvency is deferred until after most workers who are active in 2000 have already retired. By 2075 the required pay-go tax rate has reached 18.3 percent.

Under the second policy option, workers who are active in 2000 are required to contribute to the solution of Social Security's funding problem. Under a rule that requires solvency over a 75-year horizon, tax increases begin immediately. The Social Security tax rate must increase by 2.6 percentage points in 2000, the first year of the policy simulation. Until 2025 the tax increase is larger than the one required under the first policy option, but the buildup of interest-bearing reserves reduces the tax hikes needed after 2025. Workers active in 2000 pay for a larger portion of their own retirement benefits under the second option, thus modestly reducing the tax rates that must be imposed on future workers while still preserving the current benefit formula.

The third option increases funding of future pensions through the introduction of new individual retirement accounts. Social Security benefits are periodically reduced to keep the system solvent on a pay-go basis, and these benefit reductions must begin in 2024. The benefit cuts are applied to all Social Security benefits paid out in a given year. The timing of the benefit cuts coincides with the tax increases needed under the first option.

Figure 3 shows pension system reserves measured as a percent of taxable payroll. Under the first and third policy options, the reserves in the Social Security Trust Fund do not become particularly large. Under the first option, there are no pension reserves outside the Trust Fund. Under the third option, workers also accumulate sizable reserves in their individual accounts. The combined reserves of the Trust Fund and individual accounts eventually exceed 150 percent of taxable payroll. Under the second policy option, the reserve accumulated in the Social Security Trust Fund approaches 100 percent of taxable payroll, about midway between the reserve accumulations implied by the other two policies. If the accumulated pension reserves add to overall national saving, it is clear that the increases to saving will be much bigger under the second and third plans than under the first.

2.3 Distribution of Impacts on Lifetime Income

The impact of these reforms on the lifetime incomes of retiring workers is displayed in Figure 4. The effect of a reform is measured relative to a worker's income in the baseline

simulation, and lifetime income is defined as the sum of after-payroll-tax wages and gross pension benefits. We have prepared one chart for each of the nine earnings profiles, and for each profile we have calculated the impact on lifetime income for workers retiring in successive years from 2000 to 2075. The effect of the first reform option is negligible on workers who retire before 2024. Because the change imposed by the reform is limited to taxes, individuals within a given cohort all experience approximately the same percentage loss. The losses grow steadily larger for successive cohorts. Under option #2 Social Security benefits are maintained, but the tax increases occur much earlier than under the first plan. Consequently, early cohorts of retirees suffer larger lifetime income losses under the second option. Later cohorts suffer smaller losses, however, because part of the burden of achieving solvency was borne by earlier cohorts.

Option #3 produces the most interesting results. Because the benefit reductions in that plan apply to all beneficiaries, workers who retire in a given year are affected by cuts even if they retire before any benefit cut is imposed. Though the first benefit cut is delayed until 2024, the severity of the cuts after 2024 requires large retirement income sacrifices from workers who retire as early as 2015. The effects are particularly large for low-wage workers, because Social Security benefits represent a large percentage of their lifetime incomes. The loss of Social Security benefits is not offset by pensions from individual accounts, because workers retiring before about 2030 have not made contributions to the accounts during a long enough part of their careers. (We assume contributions into the private retirement accounts begin in 2000.) The size of income gain or loss varies substantially across the nine earnings profiles. Because low-wage workers receive much better Social Security benefits (relative to contributions) than middle- and high-wage workers, it is hard for them to make up the loss of Social Security benefits out of pensions derived from a DC account. It is also clear that the DC plan is particularly disadvantageous to workers who earn most of their lifetime earnings late in their careers. In contrast, the option is advantageous to high-wage workers who retire after a full career of contributions to the DC plan. For high-wage and most middle-wage workers who retire after about 2030, the introduction of an individual account plan boosts lifetime incomes. For most workers who retire before 2030 and for nearly all low-wage workers who retire before or after 2030, the individual account plan provides lower lifetime incomes than they could obtain under the two policies that maintain current Social Security benefits.

3. Incorporating the Effects of Reform on National Saving, Output, and Wages

The static analysis we have just described ignores the main rationale for reforms that fund future pension obligations—their potential to expand national saving and capital formation. An increase in the stock of capital can boost the pre-tax wages as well as pensions of future generations. There is no consensus in the literature about the extent to which additional savings in pension accounts would be offset by lower saving in the public sector or in other private accounts. Our model allows for a wide range of different assumptions. In the following analysis we adopt the extreme assumption that all net additions to pension fund reserves, after adjusting for inflation, add to net national saving. This provides a simple alternative to the extreme assumption embodied in the static analysis—that growing pension reserves have *no* impact on saving.

The potential implications of the three reforms for aggregate saving are suggested in Figure 5. These calculations show the annual additions to pension fund reserves, before the feedback effects on the capital stock have been taken into account. Because the Social Security system begins with a surplus, option #1 would generate some additions to saving up until 2015. This is followed by a 10-year period of fund decumulation. Beginning in 2025 net saving falls to zero under the pay-as-you-go rule. Option #2 generates a large increase in saving starting in 2000, when the payroll tax is increased by 2.6 percentage points. The contribution to saving ultimately shrinks as the Trust Fund stabilizes at a constant share of taxable wages. Because the contribution rate into the individual account under option #3 is set equal to the initial tax increase under option #2, the two proposals have similar implications for aggregate saving out to 2020. Once the Social Security trust fund stabilizes, however, option #3 begins to generate larger additions to net saving, in large part because reserves in the individual accounts are invested in assets with a higher yield (the private pension accounts contain a higher percentage of equities and a lower percentage of government bonds than the Social Security trust fund).

The macroeconomic effects of the additions to saving are shown in Table 1. We assume the extra saving is invested in the domestic economy.[5] As expected, the first policy option generates little or no change in future output or wages. The feedback effects of the plan are

[5] We performed additional simulations to test the sensitivity of our results to this assumption. We allowed most of the extra saving to be invested outside the United States. The major difference is that there is no change in the domestic capital-output ratio and hence no decline in the rate of return. Domestic wages are also unchanged. On the whole, the assumption of investing abroad produces results very similar to our static case.

trivial. In contrast, both options #2 and #3 generate large increases in future GDP and wages. This yields large induced changes in the receipts and benefit payments of the Social Security system. Most importantly, the increased capital accumulation drives down the rate of return to capital. This is of particular significance under option #3. The higher assumed rate of return in the individual accounts was the source of much of the extra saving accumulation under that plan.[6] As a result of the drop in the real rate of return, options #2 and #3 ultimately generate roughly equivalent increases in national saving, and thus produce similar improvements in future wages.

Figure 6 shows the distributional consequences of the reforms after macroeconomic feedback effects are taken into account. Note the striking contrast with the results of the static analysis (presented in Figure 4). In the dynamic analysis, the two reforms that boost pension accumulations and national saving generate large additions to future lifetime incomes. The gains grow over time, reversing the pattern of inter-generational transfers implied by the static analysis. This finding reflects the fact that most of the gains from a policy of increased saving are obtained in the form of higher future pre-tax wages, an impact that is missed in the static analysis which reflects only the impacts of tax-rate changes and pension cuts.

Note also that the pattern of net gains to workers in the middle- and high-wage groups is very similar under both options #2 and #3. This contrasts with the results of the static analysis, which imply that an individual account plan ultimately promises higher incomes to high- and middle-wage workers. In the dynamic simulation the large reduction in the return to capital reduces pension incomes flowing from the individual accounts, partially offsetting the improvement in workers' real wages. The reduction in the rate of return has a much smaller impact in retirement incomes under option #2, because Social Security benefits are linked to economy-wide real wages rather than to the real rate of return. The largest differences between options #2 and #3 are reflected in the results for low-wage workers. Because these workers earn a generous return under the Social Security benefit formula, they are better off under the wage-linked pension system of option #2 than under the DC pension accounts offered by option #3. Both the dynamic and static simulations imply that low-wage workers are better off if Social Security benefits are maintained. But in contrast to the static results, the dynamic results imply

[6] The model allocates a decline in the return to physical capital between the bond and equity yields in proportion to their relative yields.

that middle- and high-wage workers are about as well off when Social Security benefits are maintained as they would be if the present system were partially replaced with a DC plan. Of course, this conclusion crucially depends on the assumption that additions to pension reserves actually add to national saving.

If pension reform yields an increase in national saving that boosts wages and lowers the return on capital, the internal rate of return that workers obtain on their pension contributions no longer provides a reliable guide to the gains they derive from reform. Table 2 illustrates this point for selected workers who retire in 2045. Each row in the table refers to a worker with a particular profile of career earnings. The bottom row refers to a worker with the composite earnings profile, that is, the weighted average profile of all workers in our sample. The first three columns show real internal rates of return on workers' pension contributions under the three reform options we have been considering. The last three columns show the change in workers' lifetime incomes, taking account of both net wage and pension changes, measured as a percent of each worker's lifetime income in the baseline simulation.

Table 2. Internal Rates of Return and Changes in Lifetime Income under Alternative Reform Options for Workers Retiring in 2045, by Career Earnings Profile

	Real internal rate of return on pension contributions (%)			Change in lifetime income (% of net income in baseline)		
Career earnings profile	Option #1	Option #2	Option #3	Option #1	Option #2	Option #3
Low wage / declining trend	4.6	4.3	3.8	0.9	9.1	5.3
Average wage / rising trend	3.5	3.4	3.1	-0.7	10.0	8.9
High wage / level trend	1.8	1.7	1.8	-0.2	9.3	10.8
Composite wage profile	*2.8*	*2.6*	*2.5*	*-0.1*	*9.4*	*9.5*

Source: Authors' tabulations (see text).

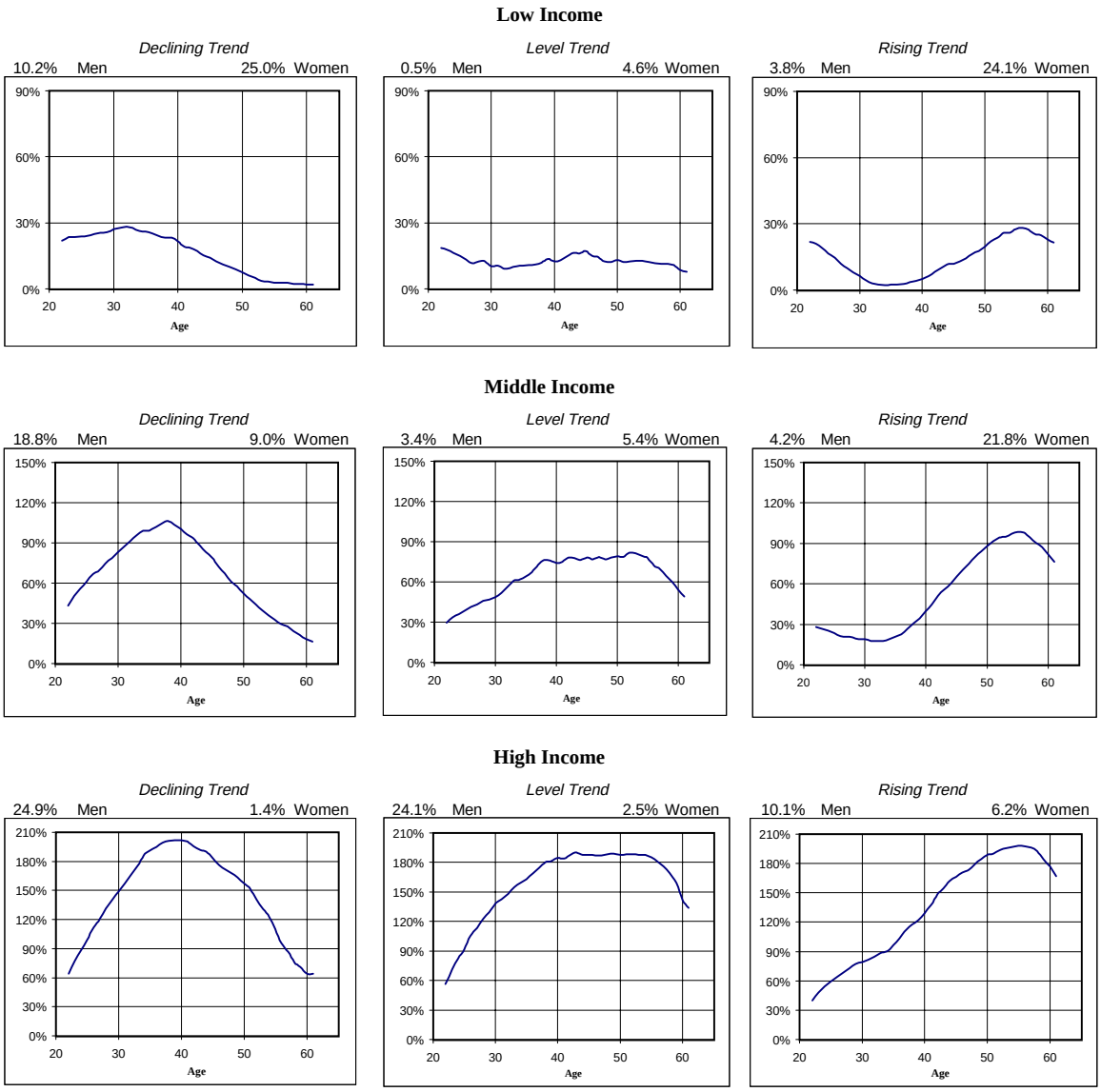
Judging by the return that workers obtain on their contributions to the pension system, option #1 clearly dominates the other two options. For each earnings profile, the real return under option #1 is at least equal to—and usually greater than—real returns under either of the other plans. Yet option #1 offers meager income gains in comparison with reforms that increase national saving. A worker with the composite wage profile receives 9½ percent more lifetime income under the two plans that require more advance funding. Workers who retire in 2045 can anticipate making substantially larger lifetime contributions if the pension system moves toward

more advance funding. If the extra contributions add to national saving and domestic investment, the higher flow of investment will increase the size of the capital stock, increasing productivity and wages, which further increases workers' required contributions to the pension system. A larger capital stock also depresses the return on capital. Because pensions are partly financed out of the interest earnings of the pension fund, the lower return on capital also pares workers' returns on their pension contributions. A plan that is beneficial for workers' incomes may be harmful for the rate of return, but it is nonetheless beneficial for workers' welfare.

Our findings highlight a weakness of any policy analysis that focuses solely on the rate of return workers obtain on their pension contributions. By focussing exclusively on retirement income, such analysis misses the impact of reform on future pre-tax wage income. For most workers, the impact of a policy on average wages is far more important in determining lifetime income than is the rate of return they obtain on pension contributions. The policies that do the most to improve workers' wages by increasing the capital-labor ratio also drive down the return on capital. Policies that appear attractive because they enhance or at least preserve the rate of return on pension contributions appear in a less favorable light if their effects on total lifetime income are assessed.

Figure 1. Age-Earnings Profiles of Nine Classes of Workers, 1931-1940 Birth Cohorts

Earnings measured as a percent of economy-wide average earnings



Source: Authors' tabulations of matched SIPP-SSER files (1990-1993 SIPP panels).

Figure 2. Solvency adjustments in OASDI tax rates and benefits

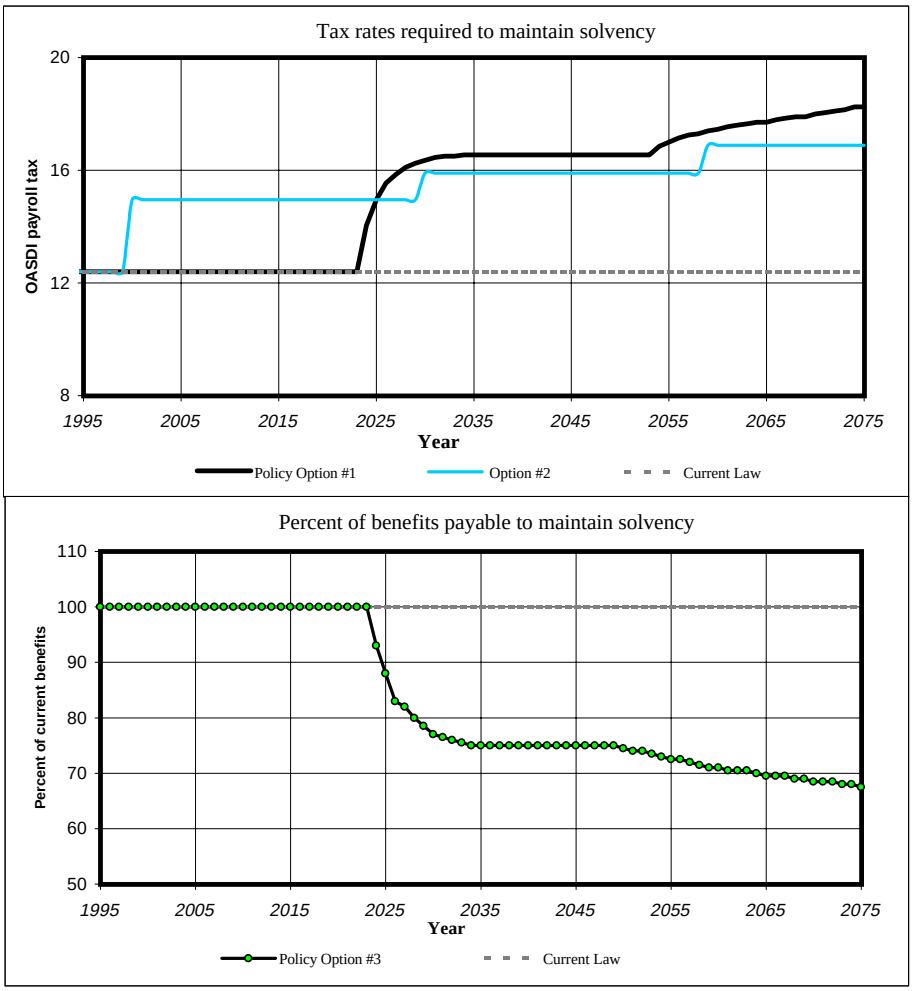
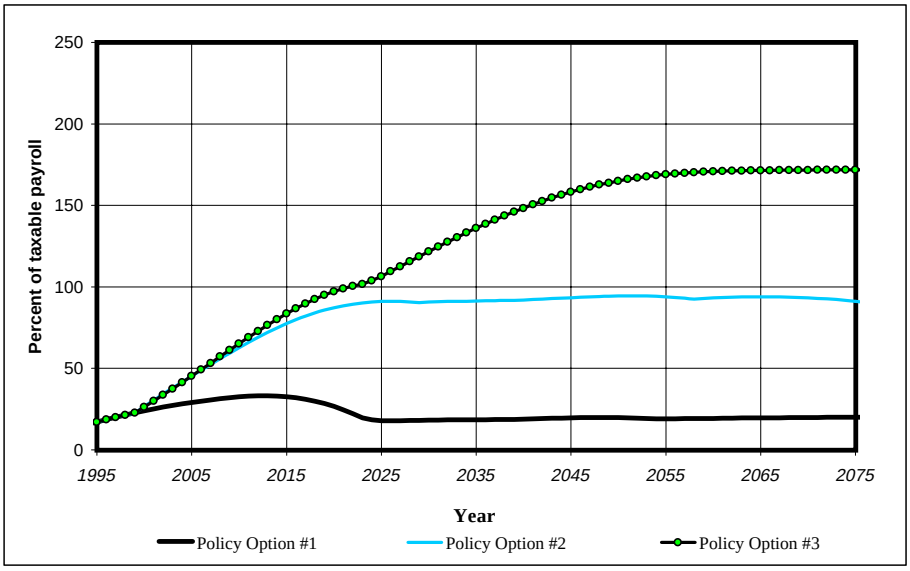


Figure 3. Pensions reserves a percent of taxable payroll in baseline



Note: Government dissaving is 0% of NNP after 1999. Additions to Trust Fund reserves do not add to national saving.

Figure 4. Total Lifetime Income as a percent of the baseline values in a static simulation

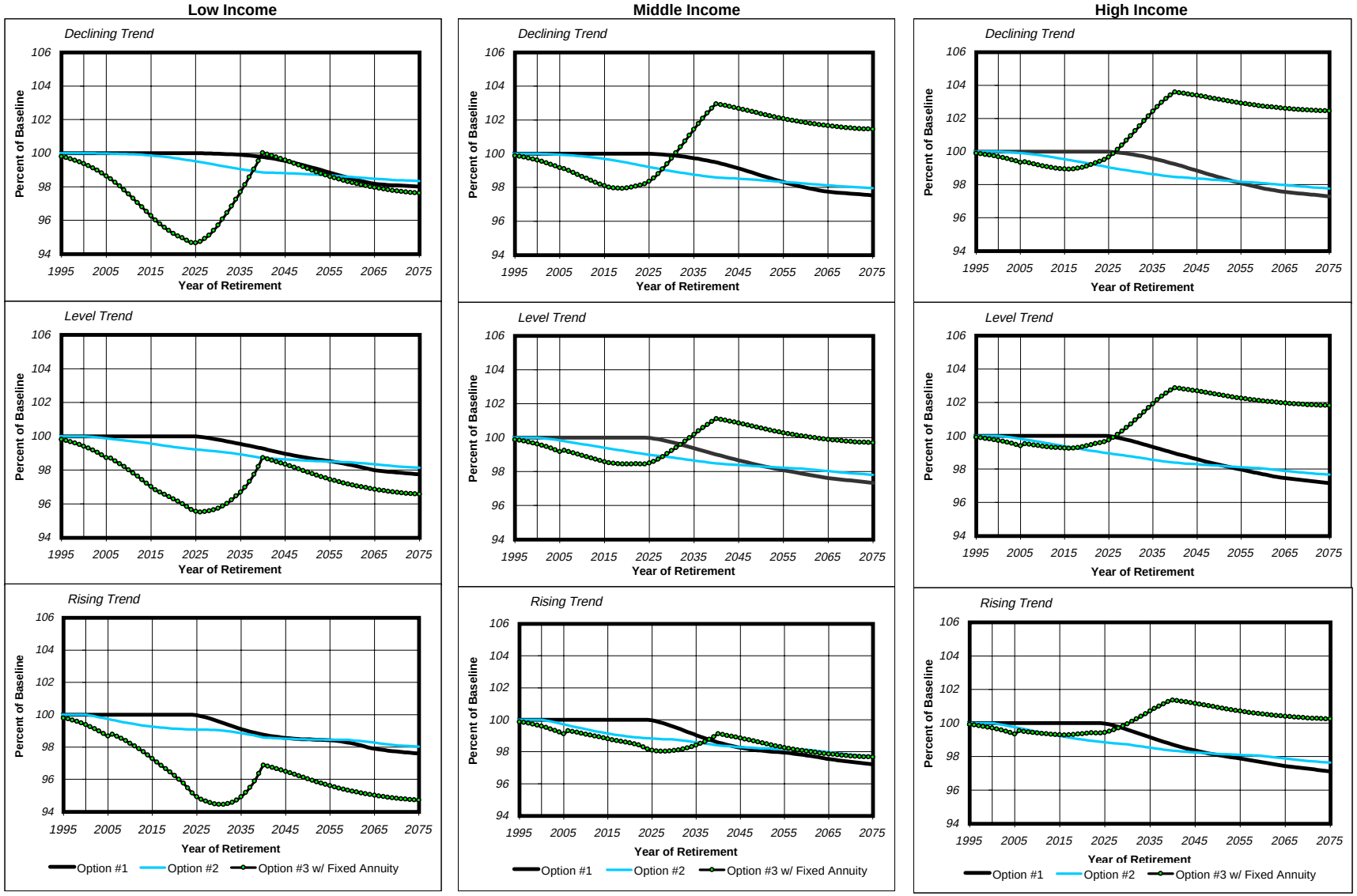
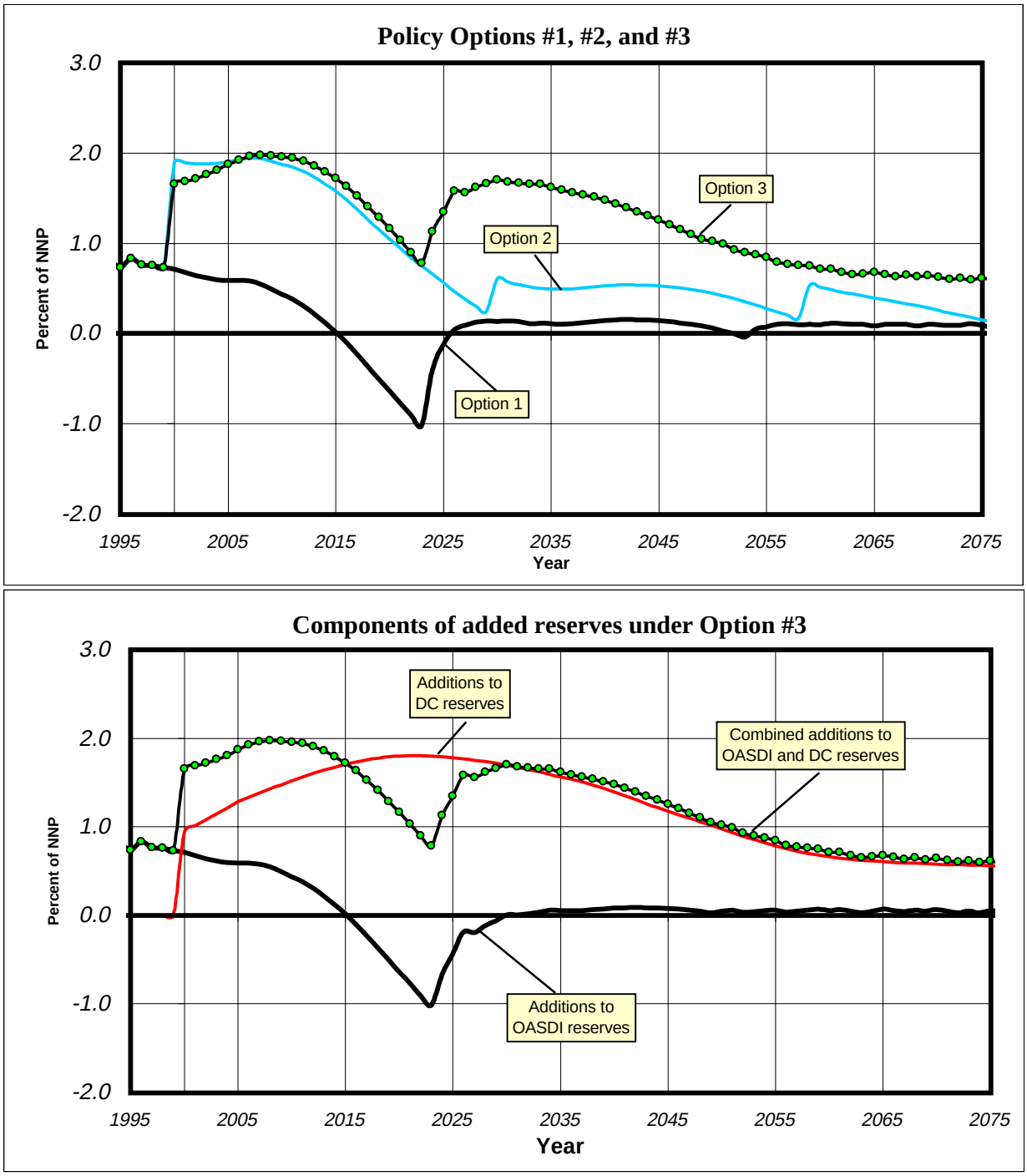


Figure 5. Additions to net savings from pensions in a static simulation



Source: Authors' tabulations.

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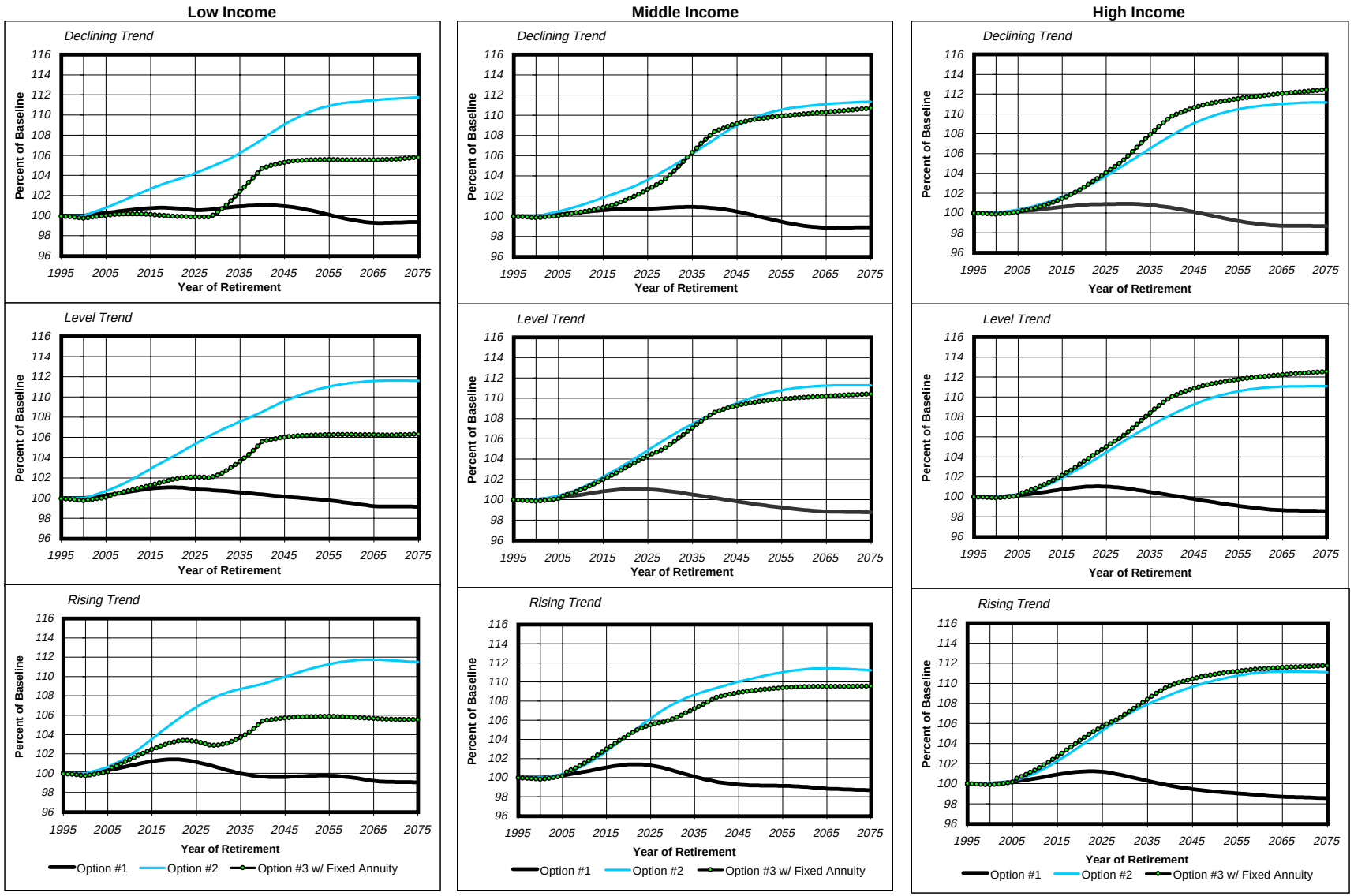

Table 1. Effects on the Economy of Alternative Social Security Reforms Dynamic Simulation

Percent change in comparison with baseline unless otherwise noted

Option # 1: Pay-as-you-go tax increases

Year	Capital services	GNP	NNP	Consumption	Wage rate	Return on capital	Net addition to saving a/
2000	0.7	0.0	0.0	-0.9	0.0	-0.3	0.7
2025	2.2	0.7	0.7	1.1	0.7	-1.2	-0.4
2050	5.1	1.1	0.7	0.5	1.4	-4.7	0.1
2075	6.2	1.4	0.9	0.7	1.7	-5.8	0.1

Option # 2: Pre-funding tax increases

Year	Capital services	GNP	NNP	Consumption	Wage rate	Return on capital	Net addition to saving a/
2000	1.9	0.0	0.0	-2.6	0.0	-0.8	2.0
2025	49.2	9.0	5.4	4.0	11.6	-32.6	1.0
2050	60.6	11.2	6.5	5.3	14.0	-40.2	0.7
2075	60.7	11.7	6.6	6.1	14.1	-41.9	0.2

Option # 3: Pay-as-you-go benefit cut + 2.6% DC pension

Year	Capital services	GNP	NNP	Consumption	Wage rate	Return on capital	Net addition to saving a/
2000	1.7	0.0	0.0	-2.3	0.0	-0.7	1.8
2025	48.2	8.9	5.4	4.3	11.5	-32.1	0.7
2050	66.6	12.1	6.9	5.6	15.2	-43.0	0.7
2075	68.9	12.9	7.1	6.1	15.7	-45.9	0.4

a/ Net addition to saving is measured as a percent of contemporaneous NNP in the baseline.