The Coming Generational Storm

by

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I thank Merrill Lynch for funding this description of America's demographic transition and its implications for America and Americans. Certain sections of this study draw very heavily and without quotation on Gokhale and Kotlikoff (2001a and 2001b), Kotlikoff, Smetters, and Walliser (2001), Gokhale, Kotlikoff, and Neuman (2001), and Ferguson and Kotlikoff (2000).

Executive Summary

This study takes a careful look at our nation's fiscal finances. It questions the much-heralded short-term federal budget surpluses, scrutinizes Social Security's and Medicare's long-term finances, and examines the nation's overall long-run fiscal balance based on a new generational accounting for the U.S.

The study also examines how the economy will respond to population aging and Social Security's privatization using a state-of-the-art life-cycle dynamic general equilibrium computer simulation model.

The study's final sections a) use a highly detailed micro simulation model to determine, on an actuarial basis, the effects of possible Social Security reforms on different postwar cohorts and income groups within those cohorts, b) use ESPlanner -- a sophisticated life-cycle financial planning model -- to assess how much baby boomers need to save as they approach retirement, particularly in light of potential major Social Security benefit cuts, and c) question, again with ESPlanner, whether saving in tax-deferred form really delivers the lifetime tax savings that are generally advertised for the majority of American households.

The study's findings are striking and discouraging. The much-heralded short-term federal budget surpluses are primarily the product of the Congressional Budget Office's (CBO) wishful thinking about Washington's ability to shrink federal spending while growing the economy.

The combination of realistic federal spending projections and the 2001 tax cut eliminates all but the off-budget surplus over the next decade. I.e., about half of CBO's total projected surplus disappears.

Even with the projected off-budget surpluses, the Social Security and Medicare programs are underfunded by roughly 40 percent. Closing that funding gap requires an immediate and permanent increase in the combined employer-employee FICA payroll tax from 15.3 percent to roughly 25 percent. Another option is immediately and permanently cutting the benefits of these programs by roughly one quarter.

A new generational accounting for the U.S., produced by Jagadeesh Gokhale of the Federal Reserve Bank of Cleveland and myself, with the assistance of John Sturrock of the Congressional Budget Office, shows that the rest of the government's long-term finances are in no position to bail out Social Security and Medicare.

Generational accounting is the only legitimate method of assessing a nation's fiscal position because, unlike deficit accounting, its conclusions aren't sensitive to fiscal nomenclature. This study demonstrates this point with a set of simple examples.

The imbalance in U.S. generational policy can be summarized in a variety of ways. One is to point out that absent higher net taxes levied on current generations, future generations will face lifetime net tax rates that are almost twice as high as those we face.

The 2001 tax cut is responsible for about one fifth of the current generational imbalance.

Given the 2001 tax cut, adjusting federal income taxes to achieve generational balance – the equalization of lifetime net tax rates levied on current and future generations -- requires an immediate and permanent 68 percent increase in personal and corporate federal income taxes.

The computer simulations indicate that the economy's performance will likely exacerbate, rather than mitigate the fiscal problems we face in the years ahead. The reason is that the higher tax burden associated with the demographic transition will siphon off much of worker's saving and culminate in less, not more, capital per worker.

Replacing Social Security with a compulsory private saving system represents a way to keep the next generation from facing dramatically higher payroll tax rates. But this "cure" is not painless since paying off the unfunded liabilities of the existing system entails a real sacrifice.

Still, the simulations demonstrate that the economic losses to current generations would be modest compared to the gains they would accrue to future generations. Moreover, as a long-run proposition, privatizing Social Security is a highly progressive policy. The welfare gains enjoyed by the poorest future members of society are 21 percent, compared with only 5 percent for the richest future members.

Fully privatizing Social Security and paying off all its unfunded liabilities may be the most responsible and progressive course of action, but it's also the least likely to be chosen by our political leaders. Hence, baby boomers and other Americans can look forward to various and major tax hikes and benefit cuts, many of which are likely to arise within the Social Security program.

This study summarizes findings from an elaborate actuarial analysis of Social Secuirty's treatment of postwar Americans. The analysis makes use of a highly detailed micro simulation model and a very precise Social Security benefit calculator. It's bottom line is this: Social Security is already represents a significant lifetime net tax for most American workers and "reforming" the system through tax hikes and benefit cuts will transform a bad deal into a raw one. Precisely who gets hurt and by how much will depend on the particular policies chosen. Direct or indirect benefit cuts, in particular, are likely to be very regressive.

Can Americans try to protect themselves from what's coming? Yes, but it will require saving at rates that far exceed what most American households typically achieve. This, at least, is the assessment one reaches using ESPlanner, a life-cycle personal financial planner that smooths household's living standards.

How one saves may be as important as how much one saves. In particular, the notion that saving in a tax-deferred form lowers everyone's lifetime taxes and permits higher lifetime spending is belied by stylized cases run through ESPlanner. Whether intentionally or not, the government has arranged our fiscal system to penalize many low- and moderate-income

households who save large sums in tax-deferred form. This point should be kept in mind by those who would partially privatize Social Security by forcing workers to contribute to tax-deferred accounts.

The lifetime tax increase and spending reduction experienced by low and moderate income households from participating fully in 401(k) and similar tax-deferred vehicles arises for three main reasons. First, withdrawals of tax-deferred balances push households into higher tax brackets in old age. Second, contributions to tax-deferred retirement accounts lowers one's tax brackets when young and, consequently, the size of the tax break from itemizing mortgage interest and other deductions. Third, and most importantly, withdrawals of tax-deferred balances when old can trigger much higher levels of Social Security benefit taxation under the federal income tax.

The lifetime tax disadvantage of contributing to a 401(k) or similar tax-deferred vehicle is greater the higher are future tax rates relative to current ones. From that perspective, the 2001 tax cut, which laid the groundwork for a major future tax hike, makes contributing to a tax-deferred account much less attractive for most Americans.

The Perfect Fiscal Storm

Close your eyes and imagine it's 2030. What do you see? A country that's older than present-day Florida, a country where the number of walkers equals the number of strollers, a country with only 15 percent more workers to pay benefits to 100 percent more retirees, and a country with high and rising poverty rates among the elderly.

You see a government in desperate trouble – raising taxes to unprecedented levels, making drastic benefit cuts, cutting domestic government spending to the bone, borrowing far beyond its capacity to repay, and printing lots of money to "meet" its bills. You also see major tax evasion, high and rising rates of inflation, a growing informal sector, a rapidly depreciating currency, large capital outflows, and more people leaving than entering the country. In short, you see an America in 2030 that looks a lot like Russia circa today.

But "gee," you say, "Things can't get that bad. After all, the country's running a huge surplus. Social Security is in close to 75-year actuarial balance. Medicare and Medicaid spending is slowing down. The government can always cut spending. Technical change will bail us out. We can always let in more immigrants. Moreover, aging has its economic benefits. Old people own wealth. Wealth represents claims on capital. So more oldsters relative to youngsters means more capital per worker and, therefore, higher labor productivity. Finally, even if the government is undersaving for the future, the public will save on its own to make up the difference."

Is our ship of state heading into the perfect fiscal storm? Or will it reach a safe harbor well before America's 77 million baby boomers switch from changing diapers to wearing them? You can ask a lot of economists and get a lot of opinions. But there aren't two right answers to

this question. And getting to the truth is well worth the investment -- for our nation, for ourselves, and for our children.

What Color's the Ink?

This paper takes a careful look at our nation's fiscal finances. It questions the much-heralded short-term federal budget surpluses, scrutinizes Social Security's and Medicare's finances, and examines the nation's overall long-term fiscal situation based on a new generational accounting for the U.S. The message of this inquiry is very unpleasant. Whether by design or through neglect, our public officials have misled the nation about its fiscal condition and dug our nation a financial hole from which it take years to climb.

The Congressional Budget Office is one of the main culprits. Its practice of making decade-long surplus projections based on extreme assumptions about federal spending have lulled the country into believing we can afford to cut taxes, raise spending, or both. The trustees of the Social Security and Medicare systems are no better. They are systematically understating the long-term costs of these programs at a time when both are underfunded by roughly 40 percent. Closing that funding gap requires either a 50 percent immediate and permanent rise in payroll tax rates or a 27 percent immediate and permanent cut in benefits or some equally foul-tasting combination of tax hikes and benefit cuts.

Learning the truth about Social Security's and Medicare's finances immediately prompts the following question: "Are the rest of the government's long-term finances sufficiently in the black to bail out these programs? The new generational accounting provides an emphatic no. This analysis, produced by Jagadeesh Gokhale of The Federal Reserve Bank of Cleveland and

myself, with the help of John Sturrock of The Congressional Budget Office (CBO), shows a huge shortfall in the nation's overall long-term finances.

The new accounting incorporates the latest CBO long-run revenue and expenditure projections with two caveats. First, it extends into the future The Joint Committee on Taxation's (JCT) decade-long estimates of the revenue and expenditure impacts of the 2001 tax cut.[1] Second, it assumes that federal discretionary spending will grow with the economy rather than decline by over one fifth relative to GDP between now and 2010. The CBO's presumed disappearing act on the part of Washington imagines that federal spending will stay fixed in real terms for a decade while the economy grows. This seems highly unlikely for reasons discussed below and is belied by the past year's experience in which discretionary spending grew as fast as the economy.

There are lots of ways to summarize the generational accounting findings. One is to assume that a) current generations pay no more in taxes, net of transfer payments, to the government than current law, including the 2001 tax cut, provides and b) all future generations will pay the same share of their lifetime labor earnings in net taxes (taxes paid net of transfer payments received). In this case, future generations are looking at lifetime net tax rates that are almost twice as high as those current generations face!

Another way to characterize the findings is to calculate the immediate and permanent increase in federal income taxes needed to achieve *generational balance* – the equalization of lifetime net tax rates facing current and future generations. Brace yourself, because the requisite tax hike is a whopping 68 percent!

[1] According to the JCT projections, the percentage loss in federal income tax revenues from the 2001 tax cut peaks in 2010. We use this 2010 percentage loss in forecasting federal income tax revenues beyond 2010.

The Bush tax cut helped, of course, make a terrible situation significantly worse. Had the 2001 tax cut not been enacted, future generations would have faced net tax rates that were 80 percent rather than 96 percent larger than those facing current generations. And we'd need a 56 percent, rather than a 68 percent immediate and permanent federal income tax hike to achieve generational balance.

Non-economists reading this are likely to wonder if we're all living on the same planet and, if so, whether these findings are to be trusted. We are, and they are. All the data used in the generational accounting analysis come straight from the same government agency – the CBO -- that has been delighting us, and I'd say, deluding us, with its short-term budget surplus projections. The grim reality is that 77 million baby boomers are going to retire within 30 years and that the federal government has done its level best to ignore and hide the implications of that fact.

Can the Economy Bail Us Out?

What about technical change and immigration? The answer is that the CBO projections already incorporate fairly optimistic assumptions about technical progress. They also incorporate the government's latest forecasts of immigration. Well, what about the potential for capital deepening arising from an aging society? Can't it raise labor productivity enough to keep us afloat? The answer is that capital deepening is not inevitable. As originally shown in Auerbach, Haggeman, Kotlikoff, and Nicoletti (1989), payroll tax hikes associated with population aging can drain so much saving out of the economy that the long-run capital-labor ratio is reduced rather than increased.

This outcome is confirmed in my recent study with Kent Smetters and Jan Walliser (Kotlikoff, Smetters, and Walliser, 2001). The study, discussed below, constructs a detailed life-cycle simulation model to examine the U.S. demographic transition. The model builds on Auerbach and Kotlikoff (1987) by including a realistic pattern of fertility by age, lifespan extension, intragenerational heterogeneity in lifetime earnings, and a detailed fiscal sector. In the baseline simulation, which assumes the continuation of pay-as-you-go finance of both Social Security and Medicare, macroeconomic conditions gradually deteriorate. Real wages per effective unit of labor fall 4 percent over the next three decades and by 10 percent over the course of the century. Wall Street, which is worried about a massive sell off of assets by retiring boomers, can relax. The steady decline in capital per worker represents good news about the real return on capital, which rises by 100 basis points by 2030 and 300 basis points by 2100.

The shrinkage of the wage tax base from the decline in the real wage and the need to pay 77 million baby boomers' Social Security and Medicare benefits necessitate major increases in payroll- and income-tax rates. In 2030, the simulated values of these tax rates are 77 and 9 percent higher, respectively, than they are today. Together, these tax increases raise the average total tax on labor income tax by 44 percent. The reduced real wage per unit of human capital coupled with the tax increases deprive the next generation of two thirds of its economic birthright. Does this statement consider the new economy and its advantages for the next generation? Yes, Taking technology-driven productivity growth into account, workers' 2030 after-tax real labor income will be only 12 percent higher, compared with 35 percent higher if tax rates and the real wage per unit of human capital were fixed.

Is there a painless way out of our demographic dilemma? The answer is no. Any policy, including replacing the existing Social Security system with a privatized system of compulsory

saving, will have losers as well as winners. But the simulations provide a light in the tunnel. They show that Social Security's full privatization can achieve very major welfare gains for future generations, particularly those with very low incomes, at moderate to small costs to transition generations.

Running for Cover

Having exposed the nation's fiscal dilemma on a programmatic as well as collective basis and having shown that the economy won't save the day, the paper turns to the implications of these findings for individual households. It does so in two ways. First, it summarizes detailed actuarial findings from Gokhale and Kotlikoff (2001a) that show how various Social Security reforms would impact particular post-war generations and groups within those generations. Second, it reviews the findings of Bernheim, Forni, Gokhale, and Kotlikoff (2000) that examine how much households approaching retirement need to save to prepare themselves for the inevitable cuts in Social Security and other benefits they are likely to experience. Finally, the study draws on Gokhale and Kotlikoff (2001b) to question whether investing in 401(k) and other tax-deferred vehicles is a tax-efficient way to save for old age.

Taken together, these three studies tell us that a) the pain inflicted from Social Security's inevitable tax hikes and benefit cuts will depend quite sensitively on how these cuts are imposed, b) that Americans close to retirement need to save at very high rates to prepare themselves for what's coming, and c) that investing large sums in a 401(k) or similar tax-deferred plan is, for most American households, a prescription for raising, rather than lowering, their lifetime taxes and lowering, rather than raising, their lifetime spending. Thus individual households must think

carefully about the risks the government's fiscal profligacy holds for them and carefully formulate their response.

The CBO's Fiscal Fantasy

In January of this year, the CBO released projections of 10-year cumulative federal surpluses equaling $5.6 trillion. Given the 2001 tax cut, this figure will surely decline in the CBO's next projection. But it's worth asking whether the January projection was realistic on its own terms. The main concern here involves the CBO's assumption that federal discretionary spending, on everything from missile defense to cigars for the president, will remain constant, adjusted for inflation, over the next 10 years. While the CBO is upfront in its small print about making this assumption, its presumed disappearing act on the part of Washington is hardly common knowledge among the American public. Indeed, most members of Congress may not understand that the CBO is making no adjustment whatsoever in projected federal spending for either population or productivity growth and that the CBO is envisioning a 20 percent decline by 2011 in the size of government relative to the economy.

As irresponsible as this may seem, it's actually an improvement over the CBO's past practice of assuming fixed nominal spending on the part of the federal government.[2] Even the CBO now admits that that practice was "unreasonable" and not "a viable guideline" for

[2] Last year's CBO baseline made an even more extreme assumption namely that discretionary spending would stay fixed/frozen in nominal terms. Even the CBO acknowledges that its use of the freeze baseline was unreasonable. In its January 2001 budget forecast it states, "Last year, CBO presented two other benchmarks for discretionary spending--a freeze level and the statutory limits on discretionary spending. Lawmakers sometimes use a freeze in appropriations--or the current year's amounts without adjustment for inflation--to gauge the impact of proposed levels of discretionary spending for the upcoming fiscal year. However, recent trends in appropriations probably make it unreasonable to assume a freeze in the baseline over the next 10 years. Throughout most of the 1990s, CBO's baseline for discretionary spending assumed adherence to the statutory limits that were originally enacted in 1990 (and extended in 1993 and 1997).[(8)] However, the discretionary spending limits expire after 2002, and it is clear from appropriations enacted in recent years that they are no longer a useful measure of current policy or a viable guideline for projecting discretionary spending in the future. (For example, the adjusted limit on discretionary outlays for 2002--$576 billion--is about $71 billion below CBO's estimate of discretionary outlays for 2001.)"

projecting spending into the future. Of course, the cat is out of the bag. Having convinced the nation that times are flush and that we have huge surpluses to spend, the politicians have done what comes naturally – spend more and tax less.

The historical record provides some perspective on the likelihood that the federal government could shrink so dramatically over the next ten years. Federal purchases as a share of GDP are currently lower than at any time in the past 40 years. In the early 60s, federal purchases were roughly 12 percent of national output. Today, they are roughly 6 percent. In the early 1960s, defense spending was 9 percent of GDP. Today, it is 3 percent. Spending on international aid as a share of GDP is also very low by historical standards. So is the third category of spending – domestic, non-defense discretionary spending.

Domestic, non-defense discretionary spending is currently running at only 3 percent of GDP. One needs to go back to the early 1960s to find such a small share of GDP being spent by the feds on domestic affairs. In many years, non-defense, domestic discretionary spending was a very much larger share of GDP than it is today. Take 1980, for example. In that year, such spending totaled 4.7 percent of GDP.

The fact that federal spending has already declined so dramatically relative to the economy means that a further shrinkage is extremely unlikely. Indeed, if defense spending grows with the economy, which the Bush administration seems to favor, real non-defense spending would have to fall by one third over the next 10 years to satisfy the CBO's forecast.

What if the CBO is wrong and discretionary spending grows with GDP? What happens to the ten-year surplus? Well, take 2011. According to the CBO's projection, nominal discretionary spending in that year will be $866 billion and the unified budget surplus will be $889 billion. But if discretionary spending grows with GDP, such spending will be $200 billion

larger in 2010 than is currently being forecast. Consequently, the surplus in 2011 will be smaller by that amount. But it will be smaller still because the government, having run smaller surpluses between now and 2011, will arrive in 2011 with more debt. More debt means more interest payments, which make projected future surpluses smaller. Interest payments in 2011 turn out, under this new scenario, to be $39 billion larger than those currently projected. If one adds the $39 billion to the $200 billion, one arrives at a 2011 surplus of $650 billion, not $889 billion. Hence, over one quarter of the 2011 projected surplus is attributable to the CBO's wishful thinking about future federal spending. For the decade as a whole, letting discretionary spending keep even with GDP eliminates almost one fifth of the $5.6 surplus.

From January to May

Spring is a time of awakening, and America is now awakening to having had the fiscal wool pulled over its head. The latest CBO figures show that far from declining as a share of GDP, federal discretionary spending between FY 2000 and FY 2001 grew almost as fast as the economy. And the CBO's unofficial estimate is that federal spending between FY 2001 and FY 2002 will grow almost twice as fast as the economy! This spring has also witnessed the passage of The Economic Growth and Tax Relief Reconciliation Act of 2001, which, according to The Joint Committee on Taxation, will reduce the cumulative federal budget surplus over the next decade by $1.7 trillion. If, over the next ten years, federal spending keeps pace with the economy and the 2001 tax act is fully implemented almost half of the CBO's vaulted $5.6 trillion surplus will evaporate. "On-budget (non Social Security and non Medicare)" surpluses, which itself represents roughly half of the pre-tax cut projected surplus, will be a thing of the past. That's highly unfortunate because "on-budget" surpluses, indeed, massive "on-budget"

surpluses, are critical to paying scheduled Social Security and Medicare benefits over time. Stated differently, the two programs' short-term "off-budget" surpluses fall far short of the extra funds they need to deal with their own long-term benefit commitments.

Social Security's Long-Term Funding Shortfall

Most Americans know that Social Security and Medicare face significant long-term financial problems. What they don't know is that these problems are about three times more severe than the trustees of the Social Security and Medicare programs acknowledge in their annual reports. Consider Social Security -- the Old Age Survivors and Disability Insurance (OASDI) program. According to off-the-record statements of its actuaries, paying over time the full amount of promised benefits necessitates an immediate and permanent 4.7 percentage point hike in the program's 12.4 percent payroll tax rate. This 38 percent tax rise needed to shore up Social Security's long-term finances is over twice the required tax increase acknowledged in the just released 2001 Social Security's Trustees' Report.

The discrepancy between the two figures reflects the Trustees' Report's truncation of its projection horizon. The Trustees' Report looks out only 75 years, whereas the 38 percent figure considers the entire future. While 75 years may seem like a long-enough horizon, projected Social Security deficits in 76 years and beyond are extremely large – on the order of three-quarters of a trillion dollars, measured in today's dollars. Ignoring the major deficits in years 76 and thereafter guarantees that successive 75-year projections will look worse because they will replace, in the prevailing 75-year window, surplus or low deficit years with high deficit years. As a result, the 75-year projection that we make, say, in the year 2015 will show a really huge

75-year funding shortfall, and we will essentially repeat today's debates about how and when to reform the system.

Did the Greenspan Commission Save Social Security or Just Delay Facing Reality?

Recall that the Greenspan Commission, headed by current Federal Reserve Board chairman Alan Greenspan, was charged in 1983 with the task of putting Social Security on a firm long-term financial footing. The Commission could have and, presumably did, project that Social Security would face a substantial 75-year financing shortfall beginning in 2001 simply because of the inclusion of 18 additional years of very large annual deficits that weren't included in 75-year projection as of 1983. It turns out that about a third of today's 75-year funding shortfall could have been anticipated back in 1983.

Unfortunately, even a 38 percent payroll tax hike would, most likely, not suffice to address Social Security's problems. The 38 percent figure is computed using the actuaries' intermediate economic and demographic assumptions. But the "intermediate" nature of these assumptions is questioned by top economists and demographers. Indeed, Social Security Advisory Board's 1999 Technical Panel recommended changes in the assumed intermediate rates of longevity improvement, real wage growth, and interest on government securities.

The most important of these changes involves projections of lifespan extension. The Technical Panel recommended a four-year increase in the life expectancy being use in the actuaries' intermediate assumptions. In demographic terms, four years is a huge increase. In advocating this increase, the Technical Panel pointed out that the actuaries were assuming it would take Americans fifty years to start living as long as the Japanese currently live. The Social Security Trustees paid mostly lip service to the Technical Panel's recommendation. They

too are under lots of political pressure to make the system look good. Consequently, they raised life expectancy assumption by only one year.

Overly optimistic OASDI forecasting is not new. As just indicated, from the perspective of 1983, only about a third of the current 75-year OASDI funding shortfall is due to the truncation of the projection horizon. The remaining two thirds is divided roughly evenly between overoptimistic economic and demographic assumptions and methodological mistakes in forecasting.

Taken together, the Technical Panel's recommended assumptions raise the OASDI tax increase needed to achieve true long-run solvency from 4.7 to almost 6 percentage points. Given the current 12.4 percent OASDI tax rate, this is almost a 50 percent tax rise! If one assumes that the Social Security Trust Fund is available to pay benefits, the system has only about 60 percent of the current and future resources it needs to continue paying benefits through time. Stated differently, Social Security is short 40 percent of the funds it needs if it doesn't want to cut benefits. If the current Trust Fund and short-term projected "off-budget" surpluses were not available, the system would be 50 percent rather than 40 percent broke.

Medicare's Long-Term Funding Imbalance

The current Medicare payroll tax rate for hospital insurance (the HI or Part A program) is 2.9 percent. In contrast to the OASDI tax, the Medicare tax is levied on all labor earnings, not simply earnings up to the Social Security covered earnings ceiling. Medicare Part B, the Supplemental Medical Insurance program, currently accounts for two-fifths of total Medicare expenditure. This program is 25-percent-financed by participant premium payments and 75-percent-financed by general revenue.

Like the OASDI Trustees, the Medicare Trustees use a 75-year truncated projection horizon and make the same longevity assumptions. And like the OASDI Trustees, the Medicare Trustees report a major funding shortfall over this period. According to their calculations, eliminating just the HI program's 75-year deficit would require an immediate and permanent 1.46 percentage point increase in the HI payroll tax rate. For reasons that aren't clear, Medicare's Trustees do not specify the income tax hike needed to eliminate the 75-year Medicare Part B funding gab.

In a recent analysis of Medicare's long-term costs, Cutler and Sheiner (2000), Harvard economist David Cutler and Federal Reserve economist Louise Sheiner extend the Medicare Trustees' projection beyond the 75-year horizon. They also measure, as a percent of total labor income, the future costs of paying for the 75 percent of the SMI program that would not be covered by Medicare participant premiums. Taking these factors into account, Cutler and Sheiner find that an immediate and permanent 4.1 percentage point increase in the Medicare tax rate is needed to achieve true long-run fiscal solvency in both parts of Medicare. This tax increase is 2.8 times larger than the 1.46 percent higher tax rate advertised by the Medicare Trustees. Enacting it would raise the Medicare tax rate by a factor of 2.4 – from 2.9 percent to 7.0 percent!

Are Medicare's Trustees To Be Trusted?

The Medicare trustees are much more optimistic than they were just three years ago. In their 1997 report, the Medicare Trustees projected that spending in 2030, when baby boomers are in the middle of their old age, would equal 7.14 percent of GDP. In 1999, they projected 2030 spending would total only 4.87 percent of GDP. The 2.27 percent of GDP discrepancy between

these numbers is enormous when you consider that Medicare expenditures are currently about 2.6 percent of GDP. Hence, between 1997 and 1999, the Medicare trustees assumed away an amount of 2030-spending on Medicare, which, when scaled relative to the economy, equals 87 percent of the current program. The optimism is greater the further out one looks. For 2070, the trustees assume away Medicare spending that exceeds the current program when scaled by the size of the economy!

The fact that the Medicare trustees projections are so different today than they were only three years ago means three things. First, the trustees are anchoring much of what they expect Medicare to spend in future years to very recent levels of spending. Second, in applying the recent slower growth rate of Medicare spending to the distant future, the trustees are paying little attention to the fact that Medicare growth has slowed in the past, due to new cost-containment policies and other reasons, only to speed up thereafter. Third, there is no guarantee that the much higher future costs projected in 1997 won't be projected again in a few years. Indeed, recent double-digit rate hikes in HMO fees reported in the Northeast and other parts of the country suggest that Medicare costs may already be on the rise.

The Social Security System's Long-Term Finances – A Summary

The combined employer-employee OASDHI payroll tax rate is now 15.3 percent. Adding to this the 6.0 and 4.1 percentage point immediate and permanent tax hikes needed to secure Social Security's and Medicare's finances delivers a payroll tax rate of 25.4 percent. A total of 18.4 percentage points of this 25.4 percent tax rate would be applied only to OASDI covered earnings; the remaining 7 percentage points would be applied to all earnings. While the government's share of the additional costs of Medicare Part B could be paid out of general

revenues, this calculation illustrates the magnitude of the fiscal burden facing today's and tomorrow's workers from the Social Security System as currently constituted. In that regard, it's worth repeating that this 10 percentage-point tax hike would only suffice to correct the Social Security System's long-term imbalances were it implemented immediately. Any delay will necessitate even higher tax increases in the future if benefits are to be paid in full.

American workers are already in very high marginal tax brackets. Indeed, when one factors-in payroll taxes, federal income taxes, the implicit marginal taxation of the earned income tax credit, state income taxes, local wage taxes, state sales taxes, federal excise taxes, and other features of our tax-transfer system, it is hard to find any workers who don't surrender 50 cents or more of each dollar earned to government either when they receive the dollar or when they spend it. Putting American workers into marginal tax brackets that are 10 percentage points higher will substantially reduce their incentives to work. It will also dramatically increase the economic distortion arising from the tax system, since these distortions rise with the square of total effective tax rates on labor supply and saving.

To sum up, the Social Security System has only about three fifths of the long-term revenues it needs to pay its bills. Getting the remaining two fifths would seriously impair the operation of our economy, not to mention the well being of today's and tomorrow's workers. But are such draconian tax hikes really needed? Or can Social Security and Medicare be rescued by the rest of the government's operations? Answering this question requires putting all of the government's fiscal activities on an equal footing. This is one of the objectives of generational accounting. Another is to measure long-term fiscal sustainability in a manner that is free of the accounting conventions that make projections of budget surpluses and deficits inherently

arbitrary even when the forecaster is impeccably responsible. It's worth digressing from the main thread of this paper to make this point clear.

Deficit Delusion and the Need for Generational Accounting[3]

Most fiscal analysts realize that official government debts don't include implicit liabilities. They also realize that Social Security and Medicare are each financed partly through general revenues. In the case of Social Security, the government collects income taxes on Social Security benefits, and in the case of Medicare, the government pays, as mentioned, most of Part B with general revenues. What most fiscal analysts don't realize is that the division of government liabilities between implicit and explicit (official) is entirely in the eyes or mouth of the beholder. The same holds for assessing the share of any particular program that is financed by general revenue. Two observers of the same fiscal reality can use different, but equally valid, fiscal labels, report entirely different levels of implicit and explicit debts, and reach entirely different conclusions about the fiscal condition of particular programs. This is one of several lessons one learns from analysing fiscal policy via generational accounting.

Generational Accounting

Generational accounts are present value measures. They represent the sum of the present values of the future *net taxes* (taxes paid minus transfer payments received) that members of a birth cohort can expect to pay over their remaining lifetimes given current policy. The sum of the generational accounts of all members of all living generations tells us how much those now alive will pay toward the government's bills. The government's bills refers to the present value

[3] This discussion of generational accounting draws heavily on Niall Fergeson and Laurence J. Kotlikoff, "The Degeneration of the Euro," *Foreign Affairs*," March 2000.

sum of all of the government's future purchases of goods and services plus its official net debt (its official financial liabilities minus its official financial assets, including the value of its public-sector enterprises). Bills not paid by current generations must be paid by future generations. This is the zero-sum nature of the *government's intertemporal budget constraint* – the basic building block of modern dynamic analyses of fiscal policy.

This budget constraint can be written as: A+B=C+D, where D is the government's official net debt, C is the sum of future government purchases, valued to the present, B is the sum of the generational accounts of those now alive, and A is the sum of the generational accounts of future generations, valued to the present. Given C+D, the smaller is B, the net payments of those now alive, the larger is A, the net payments of those yet to be born.

The comparison of the generational accounts of current newborns and the growth-adjusted accounts of future newborns provides a precise measure of generational imbalance. The accounts of these two sets of parties are directly comparable because they involve net taxes over entire lifetimes. If future generations face, on a growth-adjusted basis, higher generational accounts than do current newborns, current policy is not only generationally imbalanced, it's also unsustainable. The government cannot continue, over time, to collect the same net taxes (measured as a share of lifetime income) from future generations as it would collect, under current policy, from current newborns without violating the intertemporal budget constraint.

The Growth Adjustment

The growth adjustment referenced above is invoked for purposes of assessing the degree of generational imbalance. Once the size of A is determined, this amount is allocated to each person born in the future under the assumption that each successive generation's lifetime net tax

payment (their generational account) is x percent larger than that of the previous generation, where g is the economy's growth rate of real wages per hour. The amount to be paid by members of the first future generation (divided by 1+g) is then compared with the generational accounts of current newborns in assessing the imbalance in generational policy.

Achieving Generational Balance

The calculation of generational imbalance is an informative counterfactual, not a likely policy scenario, because it imposes the entire fiscal adjustment needed to satisfy the government's intertemporal budget constraint on those born in the future. While unrealistic, this counterfactual delivers a clear message about the need for policy adjustments. Once such a need is established, interest naturally turns to alternative means of achieving generational balance that do not involve foisting all the adjustment on future generations.

As an example, one can determine the percentage reduction in C that would lower the size of A (which, to repeat, equals C+D-B) by enough to achieve generational balance. Whatever the size of that percentage reduction in the present value of government purchases, the policy could be implemented by an immediate and permanent cut in the annual flow of those purchases by that percentage. Another example is an immediate and permanent percentage increase in annual income tax revenues. This would raise B -- the collective generational accounts of those now alive -- and thereby reduce A. The precise size of the percentage income tax hike needed to achieve generational balance is found when the growth adjusted generational accounts of future generations equal those of newborns.

Generational Accounting versus Deficit Accounting

A critical feature of generational accounting is that the size of the fiscal burden confronting future generations (the term A in A+B=C+D) is invariant to the government's fiscal labeling – how it describes its receipts and payments. The same, unfortunately, is not true of the government's reported size of its official debt. In terms of our equation A+B=C+D, different choices of fiscal labels alter B and D by equal absolute amounts, leaving C and A unchanged; i.e., the values of B and D depend on language and are not economically well defined, whereas the values of A as well as the difference D-B are independent of language and economically well defined.

Suppose, for example, that the U.S. government chose to label this year's roughly $500 billion in contributions to the social security system as "loans" instead of "taxes." Also suppose that instead of calling the future benefits it promises to pay current workers in exchange for these contributions "transfer payments," it instead calls them "return of principal plus interest" on these loans less an "old age tax" (levied at the time contributors receive their benefits). This alternative set of words would leave the U.S. government reporting a $500 billion larger deficit this year, putting the overall budget in deficit to the tune of about $300 billion. A year from now, the government's debt D would be larger but so would the generational accounts of currently living generations B since their future "old age tax" would now include in their accounts. Since D and B will both be larger by the same amount, the burden on future generations, A, is unchanged. Moreover, the economic position of each generation would also be unaffected by this alternative set of labels. Each worker would hand the government the same amount of

money this year and receive from the government the same amount of money in the future. The only thing different would be the words the government uses to describe these flows.[4]

Deficit Delusion – Some Examples

To see that the arbitrary nature of fiscal labels has nothing to do with social security per se, consider just three out of the infinite set of alternative ways a government could label taking $100 in present value in net taxes of any kind from a citizen named Nigel. In each case, r is the interest rate, Nigel's remaining lifetime net-tax payments increase by $100, and there is an additional net flow of $100 to the government from Nigel this year and no additional net flows from Nigel to the government next year.

(1) "a $100 tax levied this year on Nigel"

(2) "an $800 loan made this year by Nigel to the government less a $700 transfer payment to Nigel, plus a tax levied next year on Nigel of $800(1+r), plus a repayment next year to Nigel of $800(1+r) in principle plus interest."

(3) "a $5,000,000,000,000 tax paid this year by Nigel, less a $4,999,999,999,900 loan to Nigel this year by the government, plus a $4,999,999,999,900(1+r) transfer payment next year to

[4] The remaining lifetime budget constraints of current workers would also be unaffected by the language change since the "old age tax" has the same present value as the current "payroll tax." The fact that the worker might not survive to pay the "old age tax" is immaterial, since his estate could be described, with this alternative set of words, as being assessed the tax. One might object that the worker could avoid this estate tax by arranging his estate tax to be smaller than the amount of tax due. But this objection is overcome by describing the worker as being forced to a) buy a life insurance policy that pays an amount equal to the old age tax in the year the "benefit" is paid, b) buy an annuity that pays an amount equal to the old age tax in the year the "benefit" is paid, and c) make the government the owner of both policies. The premiums for these two policies would exactly exhaust the amount of the worker's contributions. Hence, the same coercion the government is applying to force the worker to make current "tax" contributions could be used to force the worker to purchase these "private insurance contracts." The private insurance company receiving these premium payments can be viewed as lending them to the government (i.e., investing its reserves in government bonds). The government's repayment of the principal plus interest on the bonds would then be used by the insurance company to pay off either the annuity policy, if the worker lives to the date he'd collect his "benefits," or to pay off the life insurance policy, if the worker dies before that that date. The fact that such institutional arrangements may differ from what we think are our current institutions is simply a matter of the way we are labeling our current institutions.

Nigel, plus a repayment next year by Nigel of principle and interest of $4,999,999,999,900(1+r)".

Compared to case 1's language, using the language in the other cases will generate the following: case 2: a $800 larger deficit, and case 3: a $4,999,999,999,900 smaller deficit. Although the government's reported deficit is radically different depending on how it labels the additional $100 pounds it gets this year from Nigel, Nigel's economic circumstances are unchanged. Regardless of which language the government uses, it's still getting $100 more in present value from Nigel in net taxes, and Nigel's own economic resources are, in each case, depressed by $100. Since Nigel's annual cash flows are the same, alternative choices of language have no impact on his decision with respect to how much to consume and save.[5]

The fact that the government uses one set of words to describe what it's doing doesn't make those words sacrosanct. Each of us is free to use our own set of words to describe the government's actions. Since each set of words results in a different measure of the deficit, which deficit is the correct one? The answer is there is no correct measure. There is nothing in economic theory to lead one to choose one measure over another. Stated differently, economic theory does not pin down the absolute size of D and B, just their difference. Since C is economically well defined, so is A which equals C minus the difference between D and B.[6]

[5] Moreover, the same set of economic incentives Nigel faces for saving or working are provided in all four cases. For example, suppose the government imposes an additional marginal tax rate of *t* on Nigel's current labor income in order to generate the additional $100 pounds in revenue measured in present value. In case 1, this would be described as "a tax at rate *t* on this year's labor earnings." In case 2, it would be described as "a marginal subsidy at rate *7t* to this year's labor supply plus a marginal tax on this year's labor supply at rate *8t(1+r)* where the payment is due next year." In case 3, it would be described as "a marginal tax of $50,000,000,000 *t* plus a marginal subsidy at rate *49,999,999,999(1+r)t* to be paid next year." In each case, the net marginal income from Nigel's earning an additional dollar this year is reduced by *t* times one dollar. Since Nigel's lifetime budget constraint as well as his structure of economic incentives is the same under this alternative labeling of the fiscal policy he faces, his supply of labor will be the same as well.

[6] Some economists have referred to the need to add implicit government liabilities to explicit ones in calculating the government's true debt. The difference D-B is precisely the sum of explicit plus implicit liabilities since it adds together the government's official debt and its commitments to transfers to the currently living public net of the taxes they are projected to pay.

A corollary of the fact that B by itself is not well defined is that components of B are not well defined. This means that breaking up the government's transfers and taxes and calling some of them "Social Security" and some of them "Medicare" has no economic basis. While the government may call a payment it receives from a worker a "payroll tax contribution to pay for Social Security benefits," the worker herself might call it a "payroll tax contribution to pay for building antiballistic missiles." Since money is fungible, there is no economic way to say who is right. But if we use the government's language, the Social Security system's finances will be deemed to be in better shape than if we use the worker's language.

The ongoing confusion in our national discussion of Social Security's finances and the reality of its trust fund is simply this point wrought large. The government is free to have the Treasury hand the Social Security Trust fund an I.O.U. and claim that it has helped "fund" the system and improved its long-term finances, and the man on the street is free to say that the Social Security trust fund is simply internal bookkeeping -- that this asset is offset by an offsetting liability of the Treasury, and that there is, in fact, no real asset and improvement in the system's finances. We live in a free country, where everyone can choose her or his own language. If the government wants to say that Social Security is in ok shape and the rest of the government's finances are in bad shape and someone else wants to say that Social Security is in bad shape but that the rest of the government's finances are in good shape, who's to stop them. That argument cannot be won because it's intrinsically meaningless. The only meaningful fiscal analysis entails looking at all the government's program's simultaneously and assessing overall intertemporal and generational fiscal balance, which is precisely what generational accounting does.

U.S. Generational Accounts

Table 1 reports a new set of generational accounts that take into account the 2001 tax cut and that assume that federal discretionary spending grows with the economy. The accounts were constructed using a 4.0 percent real discount rate and assuming a 2.2 percent rate of growth of labor productivity. This discount rate is roughly the current prevailing rate on long-term inflation-indexed U.S. government bonds, and the productivity growth rate, while rather high relative to the past quarter century's experience, is the one currently being projected by the CBO. The accounts are for 2000. They incorporate the CBO's latest short- and long-term projections (apart from the adjustment for discretionary spending growth) as well the Joint Committee on Taxation's estimates of the implications of the tax cut.

Table 1 shows, for males and females separately, the level and composition of the accounts. Recall that the accounts are present values discounted, in this case, to 2000. As an example, consider the $321,800 account of 25 year-old males in 2000. This amount represents the present value of the net tax payments that 25 year-old males will pay, on average, over the rest of their lives. This figure is an average. It takes into account the fact that some members of this cohort will pay more and others will pay less in net taxes. It is also an actuarial average in that it takes into account that some cohort members will die earlier than others.

Note that the generational accounts for both males and females peak at age 25 and become negative for females at age 50 and for males after at age 60. The accounts for those younger than age 25 are smaller because they have a longer time to wait to reach their peak tax-paying years. The accounts are also smaller for those above age 25 because they are closer in time to receiving the bulk of their transfer payments. By age 10 for males and age 30 for females, Medicare and Social Security benefits are the two most important forms of transfer

payments, if one uses the government's fiscal taxonomy. The relative size of Medicare transfers compared to Social Security transfers is also interesting. For 65 year-olds, the present value of Medicare benefits represent more than half of the corresponding present value of Social Security benefits.

The only figures in this table that aren't a function of classification conventions are the lifetime net tax rate of future generations and of newborns. The denominator in these lifetime tax rates is the present value of lifetime earnings. And they are constructed by pooling the net tax payments and labor earnings of males and females. In the case of future generations, the present value to 2000 of all future net taxes of all future generations is divided by the present value to 2000 of the labor earnings of all future generations.

The Imbalance in U.S. Generational Policy

For newborns, who are assumed to pay taxes and receive benefits based on current policy, the lifetime net tax rate is 17.68 percent. For future generations it is over twice as large -- 35.81 percent! Stated differently, future generations, according to current policy, are being asked to pay 18.13 cents more per dollar earned than are current newborns. In thinking about the magnitude of the U.S. generational imbalance, it's important to keep in mind that the lifetime net tax rate facing future generations under current policy assumes that *all* future generations pay this same rate. If, instead, one were to assume that generations born, say, over the next decade are treated the same as current newborns, the net tax rate for generations born in 2010 and beyond would be higher than 36.13 percent. It's also important to keep in mind that all of the figures going into the calculation are coming directly from the government. Finally, it's worth noting that higher productivity growth would not necessarily reduce the imbalance in

generational policy. Indeed, assuming a 3 percent productivity growth rate, the imbalance is 139.0 percent; i.e., future generations face lifetime net tax rates that are 2.4 times those facing today's newborns.

Digging a Deeper Hole -- The Impact of the 2001 Tax Cut

Table 2 repeats Table 1 but assumes that the 2001 tax cut was not enacted. In this case, the lifetime net tax rates are 18.65 percent and 34.69 percent for newborn and future generations, respectively. The percentage difference in this case is 86.0 percent, compared with 102.5 percent. Hence, the Bush tax cut worsened the generational imbalance by about one fifth at a time when it was huge to start with.

Policies to Achieve Generational Balance

As indicated above, our nation has one overall generational policy and saying that one part of the fiscal system is generationally imbalanced and the other is not is, at heart, an exercise in semantics. While we can't apportion blame to particular programs, we can determine how particular policy changes would alter the generational accounts of existing generations as well as the imbalance in lifetime net tax rates of newborns and future generations. The results of such generational accounting policy exercises are well defined in the sense that they are invariant to the set of fiscal labels one uses to describe fiscal policy. Stated differently, changes in the generational accounts of existing generations older than newborns, but not the level of these accounts, are the same regardless of one's fiscal language.

As we've seen, the imbalance in U.S. generational policy is gigantic. To get a different sense of its size, consider alternative policies the government would have to undertake to

equalize the net tax rates of newborns and future generations (to achieve generational balance). The first column in Table 3 lists five such policies. The first involves raising federal income taxes. To be precise, suppose the government were to eliminate its generational imbalance by immediately and permanently raising the federal corporate and personal income tax by a given percentage. How large would the tax hike have to be? The answer is 68.2 percent!

Given the CBO's projection of $1.291 trillion in income tax revenue for 2001, such a tax hike would mean an additional $880 billion in revenues this year. This, in turn, would mean a $880 Billion larger surplus. Since the FY 2001 surplus is projected at $281 billion, achieving generational balance means running a surplus that is 3.1 times larger than we are currently running. Hence, based on the government's fiscal language, the current surplus is far too small compared to what is needed to achieve generational balance.

An alternative to raising just federal income taxes is to raise all federal, state, and local taxes. In this case, an across-the-board tax hike of 25.7 percent could deliver generational balance. Of course, cutting transfer payments or government purchases are alternatives to raising taxes. Cutting all Social Security, Medicare, Medicaid, food stamps, unemployment insurance benefits, welfare benefits, housing support, and other transfer payments by 43.5 percent is another way to eliminate the generational imbalance. Two final options considered in the table are immediately and permanently cutting all government purchases by 38.9 percent or (and this is easy) cutting just federal purchases by 116.9 percent.

Cutting all government purchases to achieve generational balance would leave future generations paying in net taxes the same 17.7 percent share of lifetime earnings as current newborns are expected (under current policy) to pay. In contrast, either raising taxes or cutting transfer payments would mean higher lifetime net tax rates for those now alive. As Table 3

indicates, these alternative policies would leave newborns and all future generations paying roughly 26 cents out of every dollar earned in net taxes. This net tax rate is over 8 cents more per dollar earned than newborns are now forced to pay. The payoff from having newborns as well as everyone else who is currently alive pay more in net taxes, is a reduction in the net tax rate facing future generations of close to 10 cents per dollar earned.

Immigration and Productivity Growth

Alan Auerbach and Philip Oreopoulos (1999) engaged in an extensive study of the impact of changing immigration on the U.S. generational imbalance. They found that, fiscally speaking, immigrants cost more than they make for the country to the extent that government purchases per immigrant are equal to those per non-immigrant, so that more immigration means more government spending. But what if more immigration were not accompanied by increased discretionary spending by government? In this case, immigration reduces the imbalance in U.S. generational policy, but not by much. Indeed, Auerbach and Oreopoulos found very small effects even under extreme changes in immigration policy, including eliminating all future immigration entirely.

Turning to productivity growth, the generational accounts presented above incorporate the CBO's assumption that output per hour will grow at 2.2 percent per year. This is a pretty optimistic assumption given that productivity growth averaged only 1.7 percent per year over the past quarter century. On the other hand, productivity grew at a 2.7 percent annual rate between 1951 and 1973 and by almost 3 percent between 1996 and 2000.

Would assuming a 3 percent productivity growth rate alter the generational imbalance? Yes. It actually makes it worse. Future generations now face a 139 percent higher lifetime net

tax rate than do current newborns. With the base-case productivity growth rate, the imbalance was 86 percent. However, while the ratio of the tax rate facing future generations to that of newborns rises, both tax rates decline. Newborns now face a 12.5 percent lifetime net tax rate, rather than an 18.6 rate. And future generations face a 30.0 percent net tax rate, rather than a 34.7 percent rate.

Can the Economy Save Us?

Economists are generally regarded as people who are good with numbers, but who don't have the personalities to be actuaries. Hence, a fair question is whether all of the above is simply the wailing of a dismal scientist who is missing the dynamic forces underlying the actual economy – forces that will grow us out of our demographic problems. After all, generational accounts are rather static (what economists call partial equilibrium) measures. They ignore macroeconomic feedbacks (what economists call general equilibrium) effects on a) the supplies of labor and capital and b) the wages and interest rates earned by these factors of production that may arise during the demographic transition. The particular scenario that Wall Street both predicts and fears is that the increase in oldsters relative to youngsters will lead to a capital glut, with the supply of capital rising dramatically relative to the supply of labor, real wages soaring, and real returns to capital dropping like bricks as baby boomers dump their assets on the market. Such bad news for Wall Street would be good news for the economy since higher real wages would raise the wage base and limit requisite hikes in payroll and other tax rates.

Together with Kent Smetters and Jan Walliser, I've recently studied this issue using a new dynamic life-cycle simulation model (dubbed the KSW model) that builds on the Auerbach-Kotlikoff (1987) model by including a realistic treatment of fertility, increases over time in

longevity, multiple earnings groups within each cohort[7], the ability to simulate the model from arbitrary initial conditions, and a careful calibration of the model to U.S. fiscal conditions and institutions.

Several points require clarification. First, the KSW model permits households to give birth at different ages by assuming that each agent gives birth to fractions of children during each of her/his childbearing years. Giving birth to a half or a third or some other fraction of a child may seem weird, but it dramatically improves the model's ability to replicate the initial population age distribution and to track changes in that distribution through time. Having the right distribution of age gaps between parents and children also permits a more realistic modeling of bequests and inheritance. To be precise, since parents have children of different ages, bequests are inherited by members of different age groups, rather than concentrated into the hands of a single age group.

Second, much of our nation's projected aging is due, not to our having too few kids, but to our living too long. According to the Social Security actuaries, today's 65 year-old Americans can expect to live to age 82; in contrast those 65 in 2050 will expect to live to age 84. Incorporating this growth in life expectancy turns out to be important for producing a realistic demographic simulation.

A third big plus is having a model that begins simulations with arbitrary initial demographic and economic conditions, rather than in a demographic and economic steady state. Since the U.S. has been experiencing tremendous demographic change over this century, it is very difficult to approximate our actual age distribution by one that would arise in a situation of constant fertility and mortality rates.

[7]This feature was introduced in Altig, Auerbach, Kotlikoff, Smetters, and Walliser (2001).

The KSW Model's Findings

While the KSW model is highly stylized, it appears to be the most realistic general equilibrium computer simulation model of the demographic transition thus far developed. Ok, so what does it show? Tables 4 through 9 provide some answers. Table 4 compares the model's predictions about population aging with those of the Social Security Administration (SSA). Our model's population totals are pretty close to those of SSA through 2030, but understate projected population growth thereafter. In 2030, the model predicts there will be 22.8 percent more Americans alive than are now living. The comparable Social Security figure is 22.6 percent.

The model also does a pretty good job tracking population shares. In 2075, both the model and SSA predict that 23 percent of the population will be 65 and older. In that year the two predictions of the share of those under age 20 differ by only 1 percentage point. While the two age distributions are quite similar in the long run, they differ somewhat in the medium run. In particular, the model predicts that the elderly will be a somewhat higher share of the population than Social Security believes will be the case. Finally, note that the U.S. population will not only get old, but also stay old according to both Social Security and our model. Thus, whatever are the economic implications of America's aging, they are here to stay.

Table 5 shows the baseline simulation, which assumes a continuation of pay-as-you-go finance of Social Security and Medicare. Its message is discouraging. Rather than raise capital-labor ratios over this century, the demographic transition will lower them! Our base-line transition features capital shallowing, rather than capital deepening, that leaves the real wage per unit of effective labor 4 percent lower in 2030 and 10 percent lower in 2100 than it is today.[8]

[8] This finding differs from that of Bohn (1998) who states that "...a defined benefit social security system dampens the macroeconomic effects of demographic change without realistically overturning them.." Bohn reaches his conclusion using a very simple two-period model. The difference in findings may reflect the limitation of a two-period model or some other factor of which we aren't aware.

This bad economic news will, no doubt, cheer Wall Street because it portends a 100 basis point rise in the real return to capital for the next three decades and an additional 200 basis point rise thereafter.

Why do wages fall and returns to capital rise? The answer is that the tax hikes that occur over the century greatly reduce the amount of saving that young and middle-aged workers do over the demographic transition and, therefore, greatly reduce the amount of capital (assets) these workers bring into old age when they retire. The combined OASDHI payroll tax rate rises in the model by 77 percent over the next three decades and by 93 percent between now and 2100.[9] The model's predicted 2030 OASDHI cost rate is 24.3 percent of salary, which is somewhat higher than the 22.0 percent SSA cost rate forecast for that year. In 2075, the model's and SSA's cost rates are very close – 26.4 percent and 26.2 percent.[10]

Adding insult to injury is the fact that paying for the government's spending on goods and services and debt service will require higher average income tax rates between now and 2030 as well, indeed, 9 percent higher according to our model. In combination, the payroll and income tax hikes raise average effective tax rates on labor supply by two fifths by 2030.[11] And workers' after-tax real wages will be only 12 percent higher in 2030 than they are today. While better than nothing, this is a far cry from the 35 percent after-tax real wage increase they would enjoy were payroll tax rates to remain fixed and the aging process permitted to contribute to capital deepening.

[9] Note that we calibrate our model's payroll tax rate to the system's cost rate, which is currently 13.2 percent; i.e., we do not include in the payroll tax revenues being used to accumulate a surplus for the Social Security Trust Fund. Instead, we calibrate the model's general wage tax based on the federal government's unified budget surplus, which includes the surplus. We also calibrate the model's initial level of debt based on the federal government's unified outstanding debt net of financial assets.

[10] What if Social Security's Technical Panel is correct and lifespans rise more rapidly than the Social Security Trustees predict? In this case, the model's combined cost rate reaches 24.9 percent in 2030 and 29.1 percent in 2100.

[11] This refers to the average, as opposed to marginal, tax rate on labor supply averaged over all workers.

Another reason we don't find capital deepening is that the nation will age by considerably less when one measures the old and young in terms of their lifetime labor productivities. Recall, that it is their past labor productivity that primarily determines how much wealth the elderly have and it is their current labor productivity that determines how much labor the young have to supply. If, as the KSW model assumes, each generation is more productive than its predecessor, it's possible for the economy to get younger in terms of productivity at the same time it gets older in terms of body count. A third factor in the capital shallowing is the current level of capital to labor. The recent increase in asset valuations suggests that the U.S. ratio of assets to labor earning may be higher now than it would be were policy and the demographic structure to remain constant. I.e., aging aside, we may be embarked on a transition path that involves working off temporarily high levels of capital per worker.

What About Increases in the Retirement Age?

What if people decide to work longer? Will that save the day? We can examine this issue with the KSW model by considering the macroeconomic reaction to an assumed exogenous increase in old age productivity that leads the elderly to delay their retirement by roughly 3 years. Although both labor supply and labor income rise, workers choose to save less because they have a shorter retirement to finance. Consequently, there is a concomitant decline in the capital-labor ratio that serves to lower the real wage. The wage base, on which payroll taxes are assessed, expands due to the delay in retirement, but shrinks because of the decline in the real wage. On balance, the net impact of delayed retirement on the simulated rise in the payroll tax rate turns out to be trivial.

How About a Higher Rate of Technical Change?

A higher rate of technological progress improves, but doesn't fundamentally alter, the demographic transition. Suppose, for example, that labor productivity grows at 3 percent per year – the upper range of postwar experience. In this case, the model's 2030 tax rate is 19.2 percent, rather than 24.3 percent. This is the good news. The bad news is that real wages fall even further, reflecting the increase, in the short run, in the supply of effective labor units compared to the supply of capital.

Social Security Policies to Deal with the Demographic Transition

Table 6 shows the economic effects of gradually cutting Social Security benefits in half between now and 2030. Note that the benefit cut prevents both major increases in the program's payroll tax rate and the deleterious macroeconomic effects that would otherwise accompany the nation's aging. Indeed, the OASDHI tax rate in 2030 is only 2.0 percentage points above its 2000 level, and the capital-labor ratio is the same as in 2000. Thereafter, the supply of capital does grow more slowly than labor supply, but the long-run wage per effective unit of labor supply ends up only 2.5 percent below its initial value, compared with 9.8 percent lower in the base case.

Cutting OASI benefits directly by 50 percent, even were it done slowly, would generate lots of screaming. But cutting them indirectly, as was done in 1983, by raising the system's age of normal retirement appears to cause less of a fuss. Kotlikoff, Smetters, and Walliser (2001) also simulate a three-year increase in the normal retirement age, which constitutes a roughly 17 percent benefit cut. While the OASDHI tax hike is mitigated, but the effect is small. By 2030, the tax rate is 19.2 percent. At the end of the century, it's 20.9 percent. Hence, even a very

major increase in the OASI retirement age would not suffice to prevent major increases in the rate of payroll taxation.

Privatizing Social Security

Table 7 contemplates a more dramatic change to the OASI program, namely its complete privatization. The policy eliminates the OASI program *at the margin* by paying out only those benefits that have accrued under the existing system. To be precise, the simulation pays the OASI benefits of current retirees in full, but linearly phases out OASI benefits for new retirees over a 45-year period starting in 2000. In addition to providing current retirees their full accrued benefits and existing workers roughly what amounts to their accrued benefits, the simulation eliminates the OASI tax rate and finances transitional OASI benefits with a broad-based consumption tax.

The consumption tax rate is initially 10.1 percent. It rises as the baby boomers retire to a value of 13.6 percent in 2020 and then gradually declines. After 2062, the consumption tax is zero. The combined OASDHI payroll tax is reduced immediately by 9 percentage points. It then grows by 3.4 percentage points as costs rise for the DI and HI programs. There are substantial economic gains from privatizing social security, but they take a very long time to materialize. Compared with the base case, the real wage is 15.1 percent higher in 2100. But in 2030, the real wage is only 5.3 percent higher than it would have been absent privatization. By 2030, the capital stock is 22.5 percent larger than in the base case. By 2100, it's 77.6 percent larger. Long-run labor supply, in contrast, is somewhat smaller than in the base case. On balance, output at the end of the century is 11.1 percent greater due to privatization.

If the consumption-tax transition is slow, it's still more rapid than financing the transition with either a wage or income tax. Both of these alternative forms of finance will leave the economy in the same long-run position, but neither generates any capital deepening over the next thirty years. Indeed, as shown in Kotlikoff, Smetters, and Walliser (2001), there is capital shallowing in both cases at least through 2030 and aggregate output in that year is essentially the same as in the base case.

Compared to either wage or income taxation, the consumption tax places more of its tax burden on the initial elderly who realize they are at the end of their lives and spend at a faster clip than do the initial young and middle aged. In placing on old spenders a greater share of the burden of paying off OASI benefits and, thereby, lowering the fiscal burdens on young savers, the economy consumes less and saves more. Compared to wage and income taxes, the consumption tax represents, in part, a lump-sum tax on the economy's initial wealth. Because lump-sum taxes are non-distortionary, the consumption tax provides workers with better overall incentives to work and save.

Welfare Effects of Privatizing Social Security

Tables 8 and 9 present welfare changes arising from the 50 percent OASI benefit cut and the consumption-tax privatization examined in Tables 6 and 7. The results are presented by lifetime earnings group, with group 1 representing the lowest and group 12 the highest set of lifetime earnings within each cohort. The welfare gains are measured by determining the uniform percentage increase in a household's consumption and leisure in each remaining future year needed to attain the same level of welfare (utility) as the household experiences under the reform. Note that the welfare gain can be positive or negative depending on whether the reform

raises or lowers the household's welfare. Consider first, Table 9, which shows that low- and middle-income households alive in the long run enjoy remarkably large welfare gains from privatization. Class 3, for example, experiences close to a 21 percent gain. For Class 12, the gain is also positive, but much smaller – only 5.2 percent.

Why are these long-run gains so large? First, privatizing the OASI system prevents the doubling over the course of the century of what is already a very high tax. Second, it eliminates this very high tax. And third, it leads to substantial capital deepening. Indeed, rather than declining by 10 percent, the real wage ends up rising by 5 percent. Compared with the base case, this long-run 15 percent increase in real wages and the roughly 20 percentage-point decline in the payroll tax rate constitute strong medicine for what would otherwise be an ailing economy.

Why does the reform extract a bigger burden from high earners who are alive at the time of its enactment and provide future high earners a much smaller welfare gain than that enjoyed by the long-run middle class and poor? The answer is that the consumption tax used to finance the transition represents, in part, a tax on wealth. Why? Because when those with wealth spend their assets on consumption, they end up paying a tax. High earners have disproportionately more wealth than do low earners because they contribute a smaller fraction of their total earnings to Social Security.[12] Hence, high earners are disproportionately hurt by the consumption tax. Moreover, Social Security benefits are indexed to the consumer price level in the model as well as real world. So the poor elderly in the model are insulated from the consumption tax cut because they receive a cost of living increase when the consumption tax is adopted. Turing to the long run, low and middle earners are disproportionately benefited by the elimination of Social Security because the tax used to finance the program is highly regressive.

[12] This is due to the Social Security ceiling on taxable earnings.

Having considered Table 9, turn back to Table 8 to see the welfare effects of the gradual 50 percent benefit cut. Note that the long-run gains are much smaller for all earnings classes and that the losses to initial middle-aged and old low-income households are very large. For example, households in class 1 who are 60 years old at the time of the reform suffer a 7.049 percent loss in welfare, while their contemporaries in class 12 suffer only a .935 percent loss. This makes perfect sense. The policy cuts in half a highly progressive benefit that represents the major source of income for those in class 1, but only a pittance for those in class 12.

The lessons of these two tables are two. First, compared to cutting benefits or, for that matter, raising payroll taxes, privatization, which involves cutting benefits and payroll taxes, of Social Security can be highly progressive. Second, the advantages to the long-run poor of limiting payroll tax hikes are very substantial, not only because the payroll tax is highly regressive, but also because reducing or eliminating it generates a major increase in the level of wages.

Social Security's Treatment of Postwar Americans – How Bad Can It Get?

Whatever one makes of the just-presented case for Social Security's full-scale privatization, such a policy is not likely to be enacted. Instead, we're likely to see some combination of tax hikes and benefit cuts within the existing program plus the establishment of some minor, but mandatory private saving accounts. The real question is whether such policies will be enacted quickly enough and be big enough to keep the next generation from drowning in taxes and mounds of worthless currency that the government has printed to pay its bills.

While the generational accounting and KSW model provides a general sense of how much postwar Americans can lose from prospective Social Security "reform," carefully assessing

the impact of Social Security policy changes requires a highly detailed micro simulation model that takes into account the different economic and demographic paths a household can follow and the payroll taxes and benefits the household pays and receives along each path. By averaging over all the different tax and benefit outcomes that households with particular characteristics can experience, one arrives at the average treatment by Social Security of such households.

In Caldwell, et. al. (1999) and Gokhale and Kotlikoff (2001a), Steve Caldwell, Gokhale, I, and other colleagues developed such an actuarial valuation model by marrying Caldwell's *CORSIM* micro simulation model to the highly detailed Social Security benefit calculator in Economic Security Planner - *ESPlanner*, a life-cycle personal financial planning program developed by Economic Security Planning, Inc.

CORSIM begins in 1960 with the representative sample of Americans surveyed in the 1960 U.S. Census Public-Use Microdata Sample and then "grows" this sample demographically and economically in one-year intervals through the year 2100. Demographic growth refers to birth, death, and immigration, entry into the marriage market, family formation, family dissolution, and the attainment of schooling. Economic growth refers to working or not working, choosing annual weeks worked, and determining weekly labor earnings.[13] As detailed in Caldwell et. al. (1996), these processes are determined by over one thousand distinct equations, hundreds of rule-based algorithms, and over five thousand parameters.[14] CORSIM's alignment

[13]CORSIM's other economic processes include consumption expenditures, saving, federal, state, and local income and property taxation, individual asset holdings, inheritance, and disability.

[14] Data used to estimate and test the separate equation-based modules were drawn from large national Microdata files, including High School and Beyond (HSB), the National Longitudinal Survey (NLS), the National Longitudinal Survey of youth (NLS-Y), the Panel Study of Income Dynamics (PSID), the National Longitudinal Mortality Study (NLMS), the Survey of Consumer Finances (SCF), and the U.S. Census Public Use Microdata Sample (PUMS). Data used to construct the rule-based modules and to compute alignment factors are drawn from another six files plus miscellaneous sources.

procedures ensure that the model's in-part deterministic and in-part stochastic modules are benchmarked to historical aggregates.[15]

ESPlanner calculates the Social Security retirement, spousal, widow, widower, divorcee, mother, father, and child benefits to which the CORSIM-simulated population is eligible in each year. In forming its benefit and tax calculations, ESPlanner takes into account Social Security's earnings test, family benefit maximums, actuarial reductions and increases, benefit re-computations, eligibility rules, the ceiling on taxable earnings, and legislated changes in normal retirement ages.

Gokhale and Kotlikoff (2001a) generates synthetic data on individuals born between 1945 and 2000 by running CORSIM from 1960 through 2100 and recording each individual's demographic and economic circumstances in each year. ESPlanner is then used to calculate each individual's Social Security benefits in each year. The analysis was conducted assuming current policy as well as the following ten alternatives:

1) an immediate and permanent 38 percent increase in the OASI payroll tax rate
2) an immediate and permanent 25 percent cut in all OASI benefits.
3) an increase, starting now, by 6 months per year in the normal retirement age until the normal retirement age is raised to 70.[16]
4) use the consumer price index, rather than the OASI nominal wage index, to index average monthly covered earnings in forming recipients' Average Indexed Monthly Earnings (AIME).[17]

[15] These aggregates are typically group specific, such as the average earnings of white females ages 19 to 25 who are married with children in the home and working part time.

[16] Those achieving age 65 during the year 2001 are assigned a normal retirement age (NRA) of 65 years and 6 months; those achieving age 65 during the year 2002 are assigned NRA=66, and so on, until the NRA reaches 70.

[17] Unlike the OASI nominal wage index, which reflects both inflation and improvements in labor productivity, the CPI index reflects only inflation. Hence, in placing past earnings on an equal footing with current earnings, CPI indexing provides a credit against inflation during the interim years, but none for productivity growth. Because productivity growth is generally positive, this method reduces progressively the contribution of earnings that accrued earlier during a workers lifetime and results in a lower AIME. A lower AIME, in turn, yields a lower Primary Insurance Amount (PIA)—the retirement benefit that the worker would receive if he or she begins to collect at the applicable normal retirement age (NRA).

5) use the current formula for calculating initial benefits, but once these benefits commence, they increase over time, not by the CPI, but by the CPI minus one percent.

6) calculate retirees' primary insurance amounts as prescribed by current law, but reduce these amounts by post-year-2000 growth in labor productivity.

7) maintain the current benefit formula in all respects except one: grow the bend points used in the calculating PIAs according to inflation rather than according to the growth in the OASI wage index. Consequently, as real wages grow, successive generations of retirees will find themselves experiencing real "bracket creep," meaning that an ever larger percentage of retirees will have their benefits computed using the less progressive parts of the benefit formula.

8) eliminate the ceiling on taxable earnings, but leave unchanged the method of determining benefits.

9) eliminate the ceiling on taxable earnings, but credit earnings only up to the ceiling for purposes of determining benefits.

10) increase the years used in computing covered workers' AIME from 35 to 40 years.

Table 10 shows lifetime net Social Security tax rates under current as well as the 10 reform policies. The tax rates refer to a) the sum across all individuals in the particular characteristic cell of the present value of lifetime Social Security payroll taxes less b) the sum across all individuals in the particular characteristic cell of the present value of lifetime Social Security benefits divided by c) the sum across all individuals in the particular characteristic cell of the present value of lifetime labor earnings. The characteristic cells refer to the cohort year of birth, 1945, 1970, and 1995, and whether the individual falls within the lowest, middle, and or highest quintile of lifetime earnings.

Consider the first row of results for each cohort. Note that the OASI program significantly hurts postwar Americans as a group, but it also significantly helps poor postwar Americans. Take members of Cohort 70-74 (those born between 1970 and 1974) in the lowest lifetime earnings quintile. OASI is, in effect, handing them 3.4 cents on balance for every dollar

they earn. In contrast, those in the middle quintile face a lifetime net tax rate of 5.7 percent. Although the system is highly progressive at the bottom of the lifetime earnings distribution, it is somewhat regressive at the top. This reflects the ceiling on covered earnings.[18] In considering these figures, bear in mind that they don't include federal income taxation of Social Security benefits. Nor do they factor-in the impact of Social Security in lowering capital formation and reducing the real wage. Also, bear in mind that they are based on current policy, which, as we've seen, is unsustainable.

Consider next policies 1 and 2 that raise taxes and lower benefits. Implementing either would raise the lifetime net tax rates of all postwar generations. But the two policies have quite different intergenerational incidence. The tax hike hits later generations much harder than earlier ones. It raises Cohort 45's (those born between 1945 and 1949) lifetime net tax rate from 5.3 percent to just 5.7 percent, but it raises Cohort 95's (those born between 1995 and 2000) lifetime net tax rate from 5.4 to 8.4 percent. In contrast, the benefit cut policy leave Cohort 45's and Cohort 95's lifetime net tax rates at 6.0 percent and 6.1 percent, respectively. Clearly, earlier generations fare better under the tax hike because they have limited remaining labor earnings that are subject to the higher payroll tax rate. In the case of the benefit cut, all generations are similarly hurt because none has yet begun to receive Social Security retirement benefits, which is the lion's share of OASI benefits.

Both of these policies are tougher on the lifetime poor than on the lifetime rich. For those in the lowest quintile in Cohort 95, a 38 percent tax hike means losing close to 4 cents more per

[18] Although the rich are facing somewhat lower rates of lifetime net OASI contributions than the middle class, they are still paying, in absolute terms, much more than the middle class. To see this, multiply, for example, Table 4's 5.3 percent lifetime net tax rate for the highest quintile in Cohort 80 by $1,671,700 -- Cohort 80's average lifetime earnings. The resulting $88,600 is over five times the corresponding absolute net tax of $15,372 paid, on average, by members of Cohort 80's middle quintile.

dollar earned.[19] For their contemporaries in the highest quintile, the policy means losing only 2.6 percent more per dollar earned. With the benefit cut, these differences are even more striking. The poorest one fifth of Cohort 95 lose 3.3 percent of their lifetime incomes, whereas the richest fifth lose only 0.4 percent. Finally, it's worth noting that for the bottom quintile in Cohort 95, both the tax hike and benefit cut policies transform OASI from a net subsidy into a net tax.

How do policies 3 through 10 compare with policies 1 and 2? In terms of their impact on lifetime net tax rates, the answer is that they fall between policies 1 and 2. Several points are, however, worth stressing. First, policy 3 (the accelerated increase in NRA) hurts older cohorts more than younger ones. For example, the overall increase in the lifetime net tax rate for Cohort 45 is 0.6 compared to 0.4 for Cohort 95. This occurs because current rules already incorporate an increase in the NRA.[20] The acceleration of the increase in NRA hits those about to retire in the near future particularly hard. For example, those reaching age 65 in 2010 would have a normal retirement age of 66 under current rules, but 70 under policy 3. In contrast, the NRA of those reaching age 65 after 2022 would rise from 67 under current rules to 70 under policy 3.

Second, policies 6, 7, 8, and 9 ("Stabilize Real Per Capita Benefits," "Eliminate Earnings Ceiling," and "Eliminate Earnings Ceiling without Benefit Change") hurt younger cohorts much more than older ones. Policy 6 eliminates the real growth in benefits under the current system associated with economy-wide productivity growth. Hence, later retiring generations, whose benefits would otherwise be higher than those workers who retire earlier, lose the most from this policy. As mentioned, policy 7 imposes bracket creep: slower growth in nominal bend-point values exposes a greater fraction of each person's AIME to the relatively progressive regions of

[19] This percentage point increase precisely equals that required for eliminating the OASI imbalance.
[20] Under current rules, the NRA is scheduled to increase from 65 for those who will achieve age 65 in 2002 or earlier to 66 for those who will achieve age 65 between the years 2007 and 2019. Thereafter, the NRA will increase from 66 for those achieving age 65 before the year 2020 to 67 for those achieving age 65 in 2025.

the PIA formula. Under policy 8, the incremental lifetime earnings subject to payroll taxes are much larger for younger than for older generations because a greater fraction of the former generations' working lifetimes lies in the future. However, because of the progressive benefit formula, younger generations' benefits do not keep pace with the increase in their lifetime payroll taxes. The effect is even more pronounced when benefits are fixed under policy 9.

Third, policy 6 (and, to a lesser extent, policy 7) is extremely tough on poor members of young cohorts. For the bottom quintile of Cohort 95, policy 6 transforms OASI's 2.9 percent of lifetime earnings net subsidy into a 6.8 percent net tax and leaves this quintile with a higher net tax rate than the top quintile! Note that this policy has a much bigger impact than does policy 4 – "CPI Indexing of Covered Earnings" – on the lifetime net tax rates of poor members of young cohorts. The same can be said of middle- and upper-income young cohort members. The reason is that policy 6 directly eliminates all growth in benefits due to overall real wage growth, whereas policy 4 works by reducing the AIME. For those at the upper range of the distribution of lifetime earnings, a 1 percent reduction in the AIME translates into only a 0.15 percent reduction in benefits under policy 4. Policy 7 – "Freeze Bend Points in Real Terms" – is particularly damaging to the lifetime poor because it pushes them into lower marginal benefit brackets.

Fourth, policy 9—raising the earnings ceiling without concomitant benefit increases (without permitting the higher covered earnings to be including in the calculation of AIME)—is particularly grievous for young cohort members in the highest lifetime earnings quintile. As can be verified in the bottom panel of Table9, policy 9 raises the lifetime net tax rate of Cohort 95's

top 20 percent of lifetime earners by 3.3 percentage points. In contrast, the poorest members of this cohort experience no change in their lifetime net tax rates.[21]

Fifth, policy 10 – "Increase Computation Years from 35 to 40 – leaves unchanged the lifetime net tax rates of the top earning quintiles, whereas it raises those of the lowest and middle quintiles. The lowest quintile in each cohort is especially hard hit. The reason is that members of this quintile have many years in their earnings histories during which they don't work. Including those years in calculating AIME lowers their AIMEs and, thus, their benefit levels.

The bottom line is that the particular way one "reforms" Social Security will make a very big difference to the distribution of burdens across and within cohorts. What can Americans do to protect themselves? The answer is save. But how much more should they save, and in what form should they save? These are the final two questions to which the paper turns.

How Much Should One Save For Retirement?

This question is front and center for most baby boomers thinking about retirement. To address it, Bernheim, Forni, Gokhale, and Kotlikoff (2000) applied ESPlanner to households who participated in the first wave of the Health and Retirement Study (HRS). ESPlanner smooths households' living standards to the extent possible without putting them into debt. It also calculates how much life insurance household heads and spouses need to secure the same living standard for their survivors. The study makes its recommended saving calculations under two alternative assumptions -- that Social Security pays it promised benefits in full and that Social Security benefits are cut permanently by 30 percent starting in 15 years.

[21] In the case of policy 8, the lowest quintiles in all cohorts experience declines in their lifetime net tax rate. The explanation is that many of the observations in these quintiles receive benefits based on their spouse's earnings record and these benefits go up when all of their spouses' earnings are included in the calculation of dependent and survivor benefits, not simply their spouses' earnings up to the covered earnings ceiling.

In forming its recommendations, ESPlanner treats special expenditures and housing expenses as "off-the-top" expenses that are not subject to consumption smoothing. Contributions to and withdraws from tax-favored retirement accounts are also treated as exogenous. In addition to incorporating these inputs, ESPlanner needs projections of future earnings, assessments of the size of current non tax-favored as well as tax-favored assets, information on defined benefit pensions, and Social Security benefits for those currently collecting benefits. ESPlanner also uses past and projected future Social Security covered earnings to estimate the size of Social Security benefits for those not yet collecting. Finally, ESPlanner calculates federal and state income and payroll taxes in the process of deciding how much a household can spend without outliving its resources.[22] In forming federal and state taxable income, ESPlanner deducts, as appropriate, contributions to tax-favored accounts and includes, as appropriate, withdraws from these accounts. The program considers most, but not all, factors entering into saving and insurance decisions. Its biggest omission is the riskiness of future income and expenditures on health care and other necessities.

The study's data are drawn from the 1992 wave of the Health and Retirement Survey (HRS), which covers 12,652 respondents age 51 to 61 and their families. The analysis considers only households whose heads are age 50 through 61 and for whom covered social security earnings are available for the head, and, if married, his or her spouse. The survey collects information on a wide range of socioeconomic variables.

Table 11 presents median recommended saving rates for HRS households whose heads are sorted into two age groups – 50 to 55 and 56 to 61. The table also decomposes its results by

[22] In the case of the federal income tax, for each year and survival state, the software computes itemizable deductions, and then determines whether the household should itemize or take the federal standard deduction. The software incorporates federal deductions and exemptions, the partial taxation of social security benefits, the earned income tax credit, the child tax credit, the phase-out at higher income levels of itemized deductions, and the indexation of tax brackets to the consumer price index.

household income, marital status, race, and education. Saving rates are presented assuming that Social Security benefits will be a) paid in full or b) cut permanently by 30 percent starting in 15 years. The table's results are based on an assumed 6 percent nominal interest rate and a 3 percent inflation rate. The numerator of the saving rate is defined as non-retirement account saving; i.e., saving apart from contributions to or withdraws from retirement accounts. The income measure in the denominator also excludes net contributions to these accounts.

Consider first the results for the 50-55 year-old households assuming benefits are paid in full. The median recommended saving rate for households with incomes of $0 to $15,000 is quite small, only 1 percent. On the other hand, for those with $100,000 or more in income, it is fairly high, 17 percent. For low-income households with incomes of $15,000 to $45,000 and for moderate-income households with incomes of $45,000 to $100,000 the recommended saving rates are 13 percent and 14 percent, respectively. The fact that the median recommended saving rate is close to zero for the low-income group and that the rate rises with income is not surprising. Most low-income households will receive the majority of their post-retirement incomes from Social Security. And the higher the level of income, the smaller is the fraction of pre-retirement income being replaced by Social Security. The older sample, aged 56-61, generates the same pattern of saving rates by income. But with the exception of those with very low incomes, the median recommended saving rates are significantly higher, ranging from 17 percent for households with $15,000 to $45,000 in income to 23 percent for households with $100,000 or more in income.

Can households achieve these high saving rates by simply saving/reinvesting the income they earn on the non tax-favored assets they've accumulated to date? To examine this question, my coauthors and I calculated recommended saving rates out of non-asset income. Specifically,

we subtracted non tax-favored capital income from recommended saving to form the numerator of this revised saving rate. To form the denominator, we subtracted the same quantity from income. Hence, the denominator is income exclusive of non tax-favored asset income.

For the lowest and second-lowest income groups, median recommended saving rates are essentially unchanged for both age groups. For households with $45,000 to $100,000 in income, the new medians are 12 percent for younger households and 17 percent for older ones. The corresponding non-asset income medians for the highest income households are 13 percent for younger households and 17 percent for older ones. Hence, the answer to our question is no; while most households don't need to save as large a share of their non-asset income, they still need to save a fairly large fraction of that income.

ESPlanner generally recommends higher saving rates for single households, non-white households, and non college-educated households. In some cases, the differences are substantial. Take non-white households age 56 to 61 with $15,000 to $45,000 in income. Their median saving rate is 29 percent, which is 6 percentage points higher than the median for whites and non-whites combined. Or compare the 28 percent median rate for single households with the 21 percent median for married households in the same income and age range. While there seem to be systematic differences here that merit future research, one should not exaggerate them. Within each cell there is a very considerable variation in recommended saving rates. Indeed, knowing the particular circumstances of a household appears to be much more important than knowing its general demographic characteristics in formulating a useful saving rate recommendation.

Saving in Light of Potential Social Security Benefit Cuts

Table 11 also shows the impact of the hypothetical 30 percent benefit cut. The results are, in many cases, dramatic. Take married household with very low incomes. Their median saving rate rises by 10 percentage points in the younger group and 12 percentage points in the older group. In the second lowest income group, the recommended rates for the younger and older age groups increase by 8 and 7 percentage points, respectively. Among high-income households, the recommended saving rate increases are smaller, but non trivial. Increases in the recommended rates of saving out of non-asset income are equally large. For the middle-income groups, non-asset income saving rates now range from 16 to 22 percent.

We also did the analysis using a 8 percent nominal rate of return, which implies a 5 percent real return. For the 50-55 year-olds sample, recommended saving rates are 1, 11, 11, and 10 percent for the lowest through highest income classes. The corresponding Table 11 values are 1, 13, 14, and 17 percent. In the case of the 56-61 year-olds sample, the new medians are 1, 16, 17, and 20 percent, compared with the 0, 17, 20, and 23 percent values reported in Table 11. Thus, recommended saving rates are lower with the higher interest rate. However, earning a higher real interest rate does not mean the HRS households can ignore the possibility of a major Social Security benefit cut. With the assumed cut, the four saving rate medians are 4, 17, 16, and 12 percent for the younger income groups and 3, 21, 21, and 22 percent for the older ones. These rates are substantially higher than their counterparts that assume benefits will be paid in full.

Because of data limitations, knowing precisely the rate at which HRS households save is essentially impossible. Hence, one can't say for sure if HRS households are saving too little or too much. But causal inspection suggests that the HRS households and others like them are not

saving at anywhere near the rates suggested in Table 11, particularly when one considers the prospects for major Social Security benefit cuts.

How To Save?

Any baby boomer reading the above and concerned that she's not setting aside enough money for retirement is likely to think about increasing her tax-deferred saving if she is in a 401(k), 403(b), Keogh, or similar employer-sponsored plan. For those not covered by such a plan, investing more in a traditional IRA may come to mind. This final section of the paper suggests one think again. The reason is that participating fully in a 401(k) or similar tax deferred plan is likely to raise, not lower, your lifetime taxes and lower, not raise, your lifetime spending if you have low or moderate income. The reasons are spelled out fully in Gokhale and Kotlikoff (2001b), but the basic point is that participating in such plans may raise taxes in old age by more than they lower them when young, where all taxes are valued in the present (measured as present values).

Tax rates may be higher when retirement account withdrawals occur, either because one moves into a higher marginal federal and state tax brackets or because the government raises tax rates. In addition, reducing tax brackets when young, at the price of higher tax brackets when old, may reduce the value of mortgage deductions. Finally, and very importantly, shifting taxable income from youth to old age can substantially increase the share of Social Security benefits subject to federal income taxation.

My study with Gokhale considers stylized young couples who, together with their employers, contribute the maximum amounts permitted by typical 401(k) plans. We measure the benefit from 401(k) participation in two ways – in terms of the percentage reduction in lifetime

taxes and in terms of the percentage increase in lifetime spending financed by the tax break.[23] We find that low- and middle-income households (those earning up to $50,000 per year) who earn a real pre-tax return of 6 percent or more subject themselves to higher lifetime taxes by fully participating in the typical 401(k) plan.

Our stylized couples consist of a husband and wife who are both age 25 and live at most to age 95. Each spouse works to age 65 and earns half of the household's total earnings, which range from $25,000 to $1 million per year when they are 25. Real earnings grow annually by 1 percent. The couples live in Massachusetts and have no initial assets apart from their homes. Each couple has two children. The first is born when the couple is age 25 and the second when the couple is age 30. The market value of each couple's house is set at three times household labor earnings as of age 25.

Each couple purchases its house at age 25 by paying 20 percent down and borrowing the remainder at 8 percent for 30 years. Annual homeowner's insurance, property taxes, and maintenance are set at 0.17 percent, 1 percent, and 1 percent of house value, respectively. Each child attends college for four years. A couple earning $25,000 per year spends, by assumption, $7,500 per child for each year of college. This college expense is set at $15,000 for couples earning $50,000 and $30,000 for couples earning $100,000 or $150,000. For couples earning $200,000 or more per year, annual college expenses are capped at $35,000. There are no bequests apart from the value of home equity, which the couple chooses not to sell.

Our calculations assume elective employee contributions and employer matching contributions equal to the average of maximum contributions permitted by employer-provided defined contribution plans. The household's elective contribution is set at 13.5 percent of

[23] The terms "lifetime taxes" and "lifetime spending" refer to present values of these flows where discounting is done using the real rate of return assumed in each experiment.

earnings and the employer-matching contribution is set at 3 percent of earnings, bringing the total 401(k) contribution to 16.5 percent of earnings. At this contribution rate, the dollar contribution ceiling limits the household's contribution to $60,000 at earnings exceeding of $363,636.36.[24]

Our method of determining the lifetime net tax benefit of 401(k) participation is to compare lifetime taxes and spending with and without such participation. But to make the comparison meaningful, we need to ensure that the couple's gross income is the same in both cases. To do so we increase each spouse's earnings in the case they don't contribute to a 401(k) plan by the amount the employer contributes to their plan in the case that they do contribute. Hence, in the no-401(k) participation case, this additional income is subject to immediate federal and state income taxation as well as to payroll taxation.

As can be verified in Table 12, for a young couple with $50,000 in initial annual earnings that earns a 6 percent real return, partaking fully in the typical 401(k) plan raises lifetime tax payments by 1.1 percent and lowers lifetime expenditures by 0.4 percent. The lifetime tax hike is 6.4 percent and the lifetime spending reduction is 1.7 percent for such households if they receive an 8 percent real rate of return. These figures rise to 7.3 percent and 2.3 percent, respectively, if taxes are increased by 20 percent when the couple retires.

These findings are driven, in large part, by the additional Social Security benefit taxation induced by 401(k) withdrawals. For example, absent Social Security benefit taxation the $50,000 couple earning a 6 percent real return would lower their lifetime taxes by 2.2 percent and raise their lifetime spending by 0.5 percent by participating fully in a 401(k). The picture is quite different for high-income young couples with so much income that 401(k) participation cannot a) lower and then raise their marginal income tax rates or b) raise the share of their Social

[24] We assume this ceiling grows at 1 percent real per year.

Security benefits that is taxable. For such couples 401(k) participation means major lifetime tax savings. At a 6 percent real return, a couple earning at the rate of $300,000 per year enjoys a 6.7 percent lifetime tax break, which translates into a 3.8 percent increase in lifetime spending. These couples' continue to garner a major lifetime subsidy even if tax rates are raised by as much as a fifth when they retire.

Table 13 extends the analysis by considering what happens if taxes are raised by 20 percent when the stylized households retire. In this case, the $50,000 couple that earns a 6 percent real return on its saving suffers a 2.10 percent increase in its lifetime taxes and a .75 percent reduction in its lifetime spending from full 401(k) participation. If the same couple earns an 8 percent real return, its lifetime taxes go up by 7.29 percent and its lifetime spending goes down by 2.27 percent!

Summary and Conclusion

To summarize, the government, through its various fiscal agencies, appears to be assuming away our fiscal problems rather than confronting and exposing them. In so doing, it disserves both us and our children. Notwithstanding the rosy fiscal projections, our country has a huge imbalance in its generational policy. Without dramatic and immediate changes in policy our children are likely to face lifetime net tax rates that are twice those we face. Precisely how much of our generational problem is due to particular programs and policies is impossible to say, since where one starts and the other stops is anyone's prejudice.

Unfortunately, growing our way out of our fiscal problems isn't likely to happen. Rather than mitigate our fiscal dilemma, the economy's performance will likely exacerbate it. The

reason is that the higher tax burden associated with the demographic transition will siphon off lots of saving and culminate in less, not more, capital per worker.

Replacing Social Security with a compulsory private saving system represents a way to keep the next generation from facing much higher payroll tax rates. But this "cure" is not painless since paying off the unfunded liabilities of the existing system entails a real sacrifice. Still, the simulations discussed here demonstrate that the economic losses to current generations would be modest compared to the gains they would accrue to future generations. The simulations also show that the choice of transition finance -- the choice of how to pay off the unfunded liabilities -- makes a big difference to the economy's short- and medium-term performance and to the intra- and intergenerational distributions of welfare. As a long-run proposition, privatizing Social Security is a highly progressive policy. The welfare gains enjoyed by the poorest future members of society are 21 percent, compared with only 5 percent for the richest future members.

Privatizing Social Security and paying off all its unfunded liabilities may be the most responsible course of action, but it's also the least likely to be chosen by our political process. Hence, baby boomers and other Americans can look forward to various tax hikes and benefit cuts, many of which are likely to arise within the Social Security program. This paper points out that Social Security is already a bad deal for most American workers and that alternative ways of "reforming" the system through tax hikes and benefit cuts will transform a bad deal into a raw one. Precisely who gets gored and by how much will depend on the particular policies chosen.

Can Americans try to protect themselves from what's coming? Yes, but it will require saving at rates that far exceed what most American households typically achieve. And how one saves may be as important as how much one saves. In particular, the notion that saving in a tax-

deferred form lowers everyone's lifetime taxes and permits higher lifetime spending is belied by this paper's evidence. Whether intentionally or not, the government has arranged its fiscal system to penalize many low- and moderate-income households from saving large sums in tax-deferred form. This point should be kept in mind by those who would partially privatize Social Security by forcing workers to contribute more to tax-deferred accounts.

To conclude, the generational storm is over the horizon. It's a big one. And, at long last, we better get ready.

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Table 1 The Composition of Male Generational Accounts

(present values in thousands of 2000 dollars)

		Tax Payments				Transfer Receipts			
Age in	Net Tax	Income 2000	Income Payment	Payroll Taxes	Labor Excise Taxes	Capital OASDI Taxes	MCARE Taxes	MCAID	Welfare
0	225.1	129.1	53.5	100.1	93.4	41.1	24.0	77.9	8.0
5	240.7	142.1	59.0	110.3	99.8	44.5	38.7	78.4	8.8
10	258.1	155.2	64.7	120.7	105.1	48.1	51.8	78.0	9.7
15	287.9	171.4	72.2	133.6	110.9	52.9	58.7	77.8	10.7
20	312.3	183.1	80.3	142.3	112.9	56.8	62.7	75.4	11.4
25	321.8	184.4	88.3	141.8	109.8	61.9	59.3	69.7	11.6
30	305.3	176.1	96.4	133.3	103.6	66.5	64.1	62.4	11.0
35	278.8	162.3	106.1	120.5	97.4	72.9	68.8	55.9	10.0
40	240.1	142.2	115.7	103.7	91.1	81.2	73.0	49.8	8.6
45	191.1	116.6	122.9	83.5	82.9	91.2	72.8	43.9	7.0
50	128.8	87.6	125.7	61.8	72.3	102.9	72.8	37.6	5.3
55	63.1	58.9	122.8	41.0	61.8	117.2	68.9	31.6	3.6
60	-9.0	33.9	113.7	23.4	51.2	133.9	69.1	26.0	2.2
65	-71.4	15.6	99.4	10.8	40.9	142.9	72.9	20.9	1.2
70	-80.1	4.9	81.6	3.4	31.2	125.2	58.1	17.4	.6
75	-72.2	.7	62.1	.5	22.8	102.7	40.4	14.7	.4
80	-56.7	.0	43.4	.0	15.8	82.0	22.2	11.3	.3
85	-40.2	.0	28.3	.0	10.9	59.6	10.3	9.3	.2
90	-25.2	.0	19.0	.0	8.4	42.0	3.5	6.9	.2

Future Generations	466.0
Lifetime Net Tax Rate on Future Generations	35.81
Lifetime Net Tax Rate on Current Newborns	17.68

Generational Imbalance 102.52 percent = [(35.81-17.68)/17.58]

Source: Calculations by Laurence J. Kotlikoff and Jagadeesh Gokhale

Table 1

The Composition of Female Generational Accounts

(present values in thousands of 2000 dollars)

		Tax Payments				Transfer Receipts			
Age in 2000	Net Tax Payment	Labor Income Taxes	Capital Income Taxes	Payroll Taxes	Excise Taxes	OASDI	MCARE	MCAID	Welfare
0	87.9	70.1	19.1	61.1	89.8	38.7	25.0	61.4	27.1
5	85.5	77.2	21.0	67.2	95.7	42.0	41.6	62.2	29.8
10	83.4	84.4	23.1	73.7	100.6	45.5	57.6	62.5	32.7
15	88.0	93.3	25.8	81.7	105.5	50.2	67.9	63.2	37.0
20	91.5	98.9	28.6	86.3	106.8	54.0	75.2	61.7	38.1
25	93.0	97.4	31.3	84.5	104.0	58.8	73.5	59.2	32.7
30	77.6	90.1	34.1	77.9	98.4	62.6	79.9	55.3	25.0
35	57.4	80.5	37.7	69.5	93.2	67.9	85.4	52.0	18.2
40	28.5	68.4	41.0	59.0	87.0	74.7	90.7	49.0	12.5
45	-4.7	54.3	43.2	46.9	79.6	83.4	90.9	46.2	8.3
50	-43.1	39.4	43.8	34.0	70.8	93.6	91.1	40.9	5.3
55	-81.9	25.2	42.6	21.7	60.6	106.3	86.4	35.9	3.5
60	-126.2	13.5	39.6	11.6	50.4	121.2	86.7	31.0	2.4
65	-162.6	5.4	35.2	4.6	40.3	128.3	91.5	26.5	1.7
70	-155.0	1.2	29.9	.9	31.3	115.5	78.3	23.3	1.2
75	-134.6	.0	24.0	.0	23.2	98.4	61.7	20.8	.8
80	-101.8	.0	18.2	.0	16.6	79.9	39.3	16.9	.5
85	-72.3	.0	12.9	.0	12.1	59.6	22.8	14.6	.4
90	-47.5	.0	8.8	.0	9.1	44.5	10.1	10.4	.3

Future Females Growth-Adjusted Generational Account **181.9**

Source: Calculations by Laurence J. Kotlikoff and Jagadeesh Gokhale

Table 2

The Composition of Male Generational Accounts Absent the 2001 Tax Cut

(present values in thousands of 2000 dollars)

		Tax Payments				Transfer Receipts			
Age in 2000	Net Tax Payment	Labor Income Taxes	Capital Income Taxes	Payroll Taxes	Excise Taxes	OASDI	MCARE	MCAID	Welfare
0	236.6	138.2	55.8	100.1	93.4	41.1	24.0	77.9	8.0
5	253.3	152.2	61.5	110.3	99.8	44.5	38.7	78.4	8.8
10	272.2	166.5	67.5	120.7	105.1	48.1	51.8	78.0	9.7
15	303.8	184.2	75.3	133.6	110.9	52.9	58.7	77.8	10.7
20	329.3	196.7	83.7	142.3	112.9	56.8	62.7	75.4	11.4
25	339.3	198.1	92.1	141.8	109.8	61.9	59.3	69.7	11.6
30	322.5	189.2	100.5	133.3	103.6	66.5	64.1	62.4	11.0
35	295.3	174.3	110.6	120.5	97.4	72.9	68.8	55.9	10.0
40	255.3	152.7	120.4	103.7	91.1	81.2	73.0	49.8	8.6
45	204.4	125.0	127.8	83.5	82.9	91.2	72.8	43.9	7.0
50	139.6	93.7	130.4	61.8	72.3	102.9	72.8	37.6	5.3
55	71.3	62.7	127.1	41.0	61.8	117.2	68.9	31.6	3.6
60	-3.2	36.0	117.4	23.4	51.2	133.9	69.1	26.0	2.2
65	-67.6	16.4	102.4	10.8	40.9	142.9	72.9	20.9	1.2
70	-77.8	5.1	83.8	3.4	31.2	125.2	58.1	17.4	.6
75	-70.8	.7	63.5	.5	22.8	102.7	40.4	14.7	.4
80	-55.8	.0	44.2	.0	15.8	82.0	22.2	11.3	.3
85	-39.7	.0	28.7	.0	10.9	59.6	10.3	9.3	.2
90	-24.9	.0	19.2	.0	8.4	42.0	3.5	6.9	.2

Future Males Growth-Adjusted Generational Account	449.8
Lifetime Net Tax Rate on Future Generations	34.69
Lifetime Net Tax Rate on Current Generations	18.65
Generational Imbalance	86.02 = [(34.69-18.65)/18.65]

Source: Calculations by Laurence J. Kotlikoff and Jagadeesh Gokhale

Table 2

The Composition of Female Generational Accounts Absent the 2001 Tax Cut

(present values in thousands of 2000 dollars)

		Tax Payments				Transfer Receipts			
Age in	Net Tax	Income 2000	Income Payment	Payroll Taxes	Labor Excise Taxes	Capital OASDI Taxes	MCARE Taxes	MCAID	Welfare
0	93.7	75.1	19.9	61.1	89.8	38.7	25.0	61.4	27.1
5	91.9	82.7	21.9	67.2	95.7	42.0	41.6	62.2	29.8
10	90.6	90.6	24.1	73.7	100.6	45.5	57.6	62.5	32.7
15	96.1	100.4	26.9	81.7	105.5	50.2	67.9	63.2	37.0
20	100.1	106.3	29.8	86.3	106.8	54.0	75.2	61.7	38.1
25	101.5	104.6	32.6	84.5	104.0	58.8	73.5	59.2	32.7
30	85.8	96.8	35.5	77.9	98.4	62.6	79.9	55.3	25.0
35	64.9	86.5	39.3	69.5	93.2	67.9	85.4	52.0	18.2
40	35.2	73.5	42.7	59.0	87.0	74.7	90.7	49.0	12.5
45	.9	58.2	44.9	46.9	79.6	83.4	90.9	46.2	8.3
50	-38.7	42.1	45.4	34.0	70.8	93.6	91.1	40.9	5.3
55	-78.7	26.9	44.1	21.7	60.6	106.3	86.4	35.9	3.5
60	-124.0	14.3	41.0	11.6	50.4	121.2	86.7	31.0	2.4
65	-161.2	5.7	36.4	4.6	40.3	128.3	91.5	26.5	1.7
70	-154.1	1.2	30.8	.9	31.3	115.5	78.3	23.3	1.2
75	-133.9	.0	24.7	.0	23.2	98.4	61.7	20.8	.8
80	-101.4	.0	18.6	.0	16.6	79.9	39.3	16.9	.5
85	-72.1	.0	13.2	.0	12.1	59.6	22.8	14.6	.4
90	-47.3	.0	8.9	.0	9.1	44.5	10.1	10.4	.3

Future Females Growth-Adjusted Generational Account 178.1

Source: Calculations by Laurence J. Kotlikoff and Jagadeesh Gokhale

Table 3

Alternative Policies to Achieve Generational Balance

Policy	Current Policy Including 2001 Tax Cut: Immediate and Permanent Percentage Change in Policy Instrument	Current Policy Including 2001 Tax Cut: Equalized Lifetime Net Tax Rate	Current Policy Excluding 2001 Tax Cut: Immediate and Permanent Percentage Change in Policy Instrument	Current Policy Excluding 2001 Tax Cut: Equalized Lifetime Net Tax Rate
Raise Fed. Inc. Taxes	**68.2**	**26.1**	**56.1**	**26.1**
Raise All Taxes	**25.7**	**26.6**	**22.1**	**26.5**
Cut All Transfers	**43.5**	**25.0**	**38.5**	**25.2**
Cut All Govt. Purchases	**38.9**	**17.7**	**34.4**	**18.7**
Cut Federal Purchases	**116.9**	**17.7**	**103.5**	**18.7**

* Generational imbalance is the percentage difference in lifetime net tax rates of newborns and future generations.
Source: Calculations by Jagadeesh Gokhale and Laurence J. Kotlikoff

Table 4

Comparing the KSW Model's and Social Security's Population Projections

	Social Security Population Projections				The KSW Model's Population			
Year	Total Population Index (100 in 2000)	Population Shares			Total Population Index (100 in 2000)	Population Shares		
		0-19	20 - 64	65 +		0-19	20 - 64	65 +
2000	100.0	0.29	0.59	0.12	100.0	0.29	0.59	0.12
2005	104.1	0.28	0.60	0.12	104.6	0.27	0.60	0.13
2010	108.1	0.27	0.60	0.13	108.6	0.26	0.59	0.15
2020	116.0	0.25	0.58	0.16	116.0	0.25	0.57	0.18
2030	122.6	0.25	0.56	0.20	122.8	0.24	0.54	0.22
2050	131.2	0.24	0.56	0.21	124.2	0.23	0.53	0.23
2075	140.3	0.23	0.54	0.23	125.8	0.24	0.53	0.23

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 5

Base-Case Simulation

Year	National Income	Capital Stock	Effective Labor Supply	National Saving Rate	Before-Tax Wage	Interest Rate	OASDHI Cost Rates Model	OASDHI Cost Rates SSA
2000	1.000	1.000	1.000	.046	1.000	.075	.137	.131
2005	1.091	1.064	1.101	.044	.992	.077	.145	.136
2010	1.191	1.137	1.209	.047	.985	.079	.158	.147
2020	1.361	1.271	1.393	.030	.977	.081	.197	.183
2030	1.529	1.366	1.587	.011	.963	.084	.243	.220
2050	1.889	1.500	2.039	.015	.926	.095	.257	.237
2075	2.479	1.845	2.736	.023	.906	.101	.264	.262
2100	3.303	2.421	3.663	.027	.902	.103	.265	na

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 6

Gradually Cutting Social Security Benefits in Half

Year	National Income	Capital Stock	Effective Labor Supply	National Saving Rate	Before-Tax Wage	Interest Rate	OASDHI Cost Rates	
							Model	SSA
2000	1.000	1.000	1.000	.065	1.000	.076	.136	.131
2005	1.096	1.094	1.096	.062	.999	.076	.135	.136
2010	1.200	1.198	1.201	.063	.999	.076	.138	.147
2020	1.387	1.403	1.382	.048	1.004	.075	.148	.183
2030	1.578	1.578	1.578	.029	1.000	.076	.156	.220
2050	1.967	1.886	1.995	.027	.986	.079	.167	.237
2075	2.602	2.423	2.665	.033	.976	.082	.171	.262
2100	3.472	3.218	3.561	.035	.975	.082	.171	na

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 7

Privatizing Social Security Using Consumption-Tax Finance

Year	National Income	Capital Stock	Effective Labor Supply	National Saving Rate	Before-Tax Wage	Interest Rate	OASDHI Cost Rates	
							Model	SSA
2000	1.000	1.000	1.000	.063	1.000	.076	.047	.131
2005	1.096	1.093	1.098	.062	.999	.076	.051	.136
2010	1.201	1.199	1.202	.066	.999	.076	.056	.147
2020	1.396	1.434	1.383	.059	1.009	.074	.068	.183
2030	1.598	1.674	1.574	.046	1.016	.072	.081	.220
2050	2.056	2.230	2.001	.051	1.027	.070	.081	.237
2075	2.753	3.145	2.633	.048	1.045	.066	.081	.262
2100	3.684	4.299	3.499	.046	1.053	.065	.081	na

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 8

Welfare Effects of Gradually Cutting Social Security Benefits in Half

(base-case percentage change in lifetime consumption and leisure needed to achieve policy-induced utility level)

Generation's Year of Birth Relative to Policy Start Year	Class 1	Class 3	Class 6	Class 9	Class 12
-81	.020	.024	.025	.025	.018
-70	-3.701	-3.269	-2.585	-2.115	-.735
-60	-7.049	-5.870	-4.599	-3.555	-.935
-50	-5.180	-4.424	-3.288	-2.587	-.787
-40	-3.136	-2.281	-1.748	-1.474	-.640
-30	-.467	-.294	-.246	-.310	-.419
-20	1.871	1.722	1.494	1.244	.142
5	8.468	8.088	7.176	6.258	1.583
30	10.320	10.450	9.483	8.296	2.383
55	10.795	11.142	10.221	9.085	2.735
80	10.959	11.369	10.450	9.300	2.823

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 9

Welfare Effects of Privatization with Consumption-Tax Transition Finance

(base-case percentage change in lifetime consumption and leisure needed to achieve policy-induced utility level)

Generation's Year of Birth Relative to Policy Start Year	Class 1	Class 3	Class 6	Class 9	Class 12
-81	-.121	-.337	-.493	-.563	-.622
-70	-.574	-.820	-.978	-1.025	-1.271
-60	-1.502	-1.899	-1.972	-1.923	-1.507
-50	-2.858	-2.836	-2.598	-2.452	-1.605
-40	-2.935	-2.569	-2.294	-2.193	-1.813
-30	-1.641	-1.301	-1.177	-1.220	-1.810
-20	.876	1.254	1.258	1.109	-1.125
5	9.407	9.409	8.480	7.424	.941
30	17.982	17.853	16.019	14.022	3.994
55	20.172	20.340	18.353	16.113	4.994
80	20.692	20.941	18.921	16.620	5.221

Source: Kotlikoff, Smetters, and Walliser (2001)

Table 10 The Impact of Potential OASI Reforms on Lifetime Net Tax Rates
All Observations (r=5%)

Quintile of Lifetime Earnings:	Lowest	Middle	Highest	All
		Birth Cohort 1945-49		
0 Current Rules	-4.2	6.1	5.0	5.3
1 38% Tax Hike Beginning in Year 2000	-3.9	6.4	5.3	5.7
2 25% Benefit Cut Beginning in Year 2000	-.2	7.1	5.4	6.0
3 Acclerated Increase in NRA	-1.7	6.9	5.4	5.9
4 CPI Indexing of Covered Earnings	-3.0	6.4	5.1	5.6
5 Indexing Benefits by CPI Minus 1%	-2.5	6.5	5.1	5.6
6 Stabilize Real Per Capita Benefits	-2.3	6.6	5.2	5.7
7 Freeze Bend Points in Real Terms	-3.8	6.3	5.0	5.4
8 Eliminate Earnings Ceiling	-4.4	6.1	5.3	5.5
9 Eliminate Earnings Ceiling w/o Benefit Change	-4.2	6.1	5.4	5.6
10 Increase Computation Years from 35 to 40	-3.5	6.3	5.0	5.4
		Birth Cohort 1970-74		
0 Current Rules	-3.4	5.7	5.3	5.4
1 38% Tax Hike Beginning in Year 2000	-1.1	8.4	7.1	7.6
2 25% Benefit Cut Beginning in Year 2000	.0	6.9	5.7	6.1
3 Acclerated Increase in NRA	-1.6	6.5	5.6	5.9
4 CPI Indexing of Covered Earnings	-2.2	6.1	5.4	5.6
5 Indexing Benefits by CPI Minus 1%	-1.9	6.2	5.4	5.7
6 Stabilize Real Per Capita Benefits	1.9	7.5	5.9	6.5
7 Freeze Bend Points in Real Terms	-2.2	6.3	5.5	5.8
8 Eliminate Earnings Ceiling	-4.1	5.7	7.7	6.9
9 Eliminate Earnings Ceiling w/o Benefit Change	-3.4	5.7	8.2	7.3
10 Increase Computation Years from 35 to 40	-2.6	5.9	5.3	5.5

		Birth Cohort 1995-00			
0	Current Rules	-2.9	5.5	5.4	5.4
1	38% Tax Hike Beginning in Year 2000	.9	9.3	8.0	8.4
2	25% Benefit Cut Beginning in Year 2000	.4	6.7	5.8	6.1
3	Acclerated Increase in NRA	-1.3	6.2	5.6	5.8
4	CPI Indexing of Covered Earnings	-1.7	5.9	5.5	5.6
5	Indexing Benefits by CPI Minus 1%	-1.5	5.9	5.5	5.6
6	Stabilize Real Per Capita Benefits	6.8	9.0	6.6	7.5
7	Freeze Bend Points in Real Terms	-.9	6.4	5.7	5.9
8	Eliminate Earnings Ceiling	-3.3	5.5	8.2	7.1
9	Eliminate Earnings Ceiling w/o Benefit Change	-2.9	5.5	8.7	7.5
10	Increase Computation Years from 35 to 40	-2.2	5.7	5.4	5.5

Source: Gokhale and Kotlikoff (2001a)

Table 11

ESPlanner's Median Recommended Non Tax-Favore d Saving Rates

(ratio of non tax-favored saving to income by income and demographic group)

	$0 - $15,000			$15,000 - $45,000			$45,000 - $100,000			$ 100,000 +		
50-55	Full	Cut	Obs	Full	Cut	Obs	Full	Cut	Obs	Full	Cut	Obs
Total Sample	.01	.06	243	.13	.20	533	.14	.19	502	.17	.20	116
Married	.00	.10	37	.09	.17	272	.14	.19	429	.17	.20	111
Single	.01	.05	206	.17	.24	261	.20	.24	73	.28	.29	5
Non White	.02	.06	126	.19	.25	169	.18	.22	61	.21	.23	17
Non College	.01	.05	226	.13	.20	445	.16	.21	317	.18	.21	52
56-61												
Total Sample	.00	.03	320	.17	.23	582	.20	.25	454	.23	.25	109
Married	-.11	.01	48	.14	.21	310	.20	.25	408	.23	.25	99
Single	.02	.03	272	.23	.28	272	.23	.26	46	.19	.20	10
Non White	.01	.02	153	.23	.29	153	.24	.30	56	.06	.08	8
Non College	.00	.03	303	.18	.24	474	.22	.27	290	.23	.26	50

Source: B. Douglas Bernheim, Lorenzo Forni, Jagadeesh Gokhale, and Laurence J. Kotlikoff (1999)

Table 12

Percentage Change in Lifetime Taxes and Spending from 401(k) Participation

Real Return ?	4 percent		6 percent		8 Percent	
Age-25 Earnings ($)	**Taxes**	**Spending**	**Taxes**	**Spending**	**Taxes**	**Spending**
25,000	-2.70	0.29	1.66	-0.36	9.37	-1.60
50,000	-3.34	0.70	1.10	-0.39	6.38	-1.73
100,000	-5.23	1.95	-2.40	0.89	0.84	-0.35
150,000	-5.87	2.81	-2.44	1.15	0.38	-0.18
200,000	-8.32	4.33	-5.19	2.62	-2.56	1.24
250,000	-8.97	5.14	-6.55	3.58	-4.23	2.22
300,000	-8.43	5.10	-6.71	3.84	-4.23	2.31
1,000,000	-4.68	3.61	-4.56	3.24	-4.50	2.99

Note: Lifetime taxes and spending refer to the present value, discounted at 6 percent real, of the couples' annual taxes and spending on consumption, housing, college tuition, and life insurance premiums.
Source: Gokhale and Kotlikoff (2001b)

Table 13

Percent Change in Lifetime Taxes and Spending from 401(k) Participation Assuming 20 Percent Higher Tax Liability After Retirement

Real Return ?	4 percent		6 percent		8 Percent	
Age-25 Earnings ($)	**Taxes**	**Spending**	**Taxes**	**Spending**	**Taxes**	**Spending**
25,000	-2.45	0.30	2.27	-0.51	10.69	-2.03
50,000	-2.49	0.57	2.10	-0.75	7.29	-2.27
100,000	-4.39	1.94	-1.65	0.71	1.49	-0.71
150,000	-4.94	2.84	-1.73	0.98	0.87	-0.49
200,000	-7.60	4.88	-4.59	2.85	-2.12	1.27
250,000	-8.55	6.15	-5.99	4.10	-3.81	2.50
300,000	-8.15	6.25	-6.29	4.57	-3.75	2.58
1,000,000	-5.01	5.17	-4.79	4.52	-4.55	3.99

Note: Lifetime taxes and spending refer to the present value, discounted at 6 percent real, of the couples' annual taxes and spending on consumption, housing, college tuition, and life insurance premiums.
Source: Gokhale and Kotlikoff (2001b)