

# **How Much and In What Manner Should Americans Save?**

**Report to the U.S. Department of Labor**

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## Abstract

This study uses *ESPlanner*<sup>TM</sup> -- a life-cycle, financial planning model -- to investigate how much American households should save and to understand the best form in which to do so. *ESPlanner's* saving and life insurance recommendations generate the smoothest possible survival-state contingent lifetime consumption path for the household without putting it into debt. Such consumption smoothing is predicted by economic theory and appears, in general, to accord with actual behavior. By running households through *ESPlanner* based on current policy as well as on alternative fiscal policies, one can easily compare the program's recommended consumption and saving response to hypothetical tax and transfer policy changes and assess the degree to which borrowing constraints (the inability to borrow significant amounts beyond one's mortgage) may be playing a role in determining the size of those responses. The program can also indicate what method of saving, be it in 401(k) and other tax-deferred accounts, Roth IRAs, or in non-retirement accounts is most efficacious with respect to minimizing lifetime taxes and maximizing lifetime consumption.

The 964 households used in our analysis are drawn from the Federal Reserve's 1995 Survey of Consumer Finances. This data set provides detailed information on household earnings, assets, housing, demographics, and retirement plans -- all of which is used by *ESPlanner* in formulating its recommendations. The policies we consider are tax hikes, tax cuts, social security benefit cuts, and the elimination of tax-deferred saving. Our analysis distinguishes between immediate and future policy changes as well as between permanent and temporary ones.

Our results are strongly influenced by the fact that a majority—58 percent—of our sample of households, many of which are young, is borrowing-constrained and, thus, more responsive to current than future policy changes no matter how long their duration. Borrowing constraints refer to the inability to smooth one's consumption without incurring additional non-mortgage debt. In running *ESPlanner*, we assume that households cannot borrow simply to smooth their living standards, as apart from buying a home. This ignores the ability of households to borrow relatively small sums on their credit cards. But including a relatively small credit card borrowing limit would make very little difference to our results. While we assume a zero-non mortgage debt limit in running our sample households through the program, the fact that 58 percent of the households can't perfectly smooth their living standards without going into debt represents a finding, rather than an assumption, of our analysis.

Because so many of our sample households are borrowing constrained, their consumption and saving responses to policy changes are very sensitive to the particular policy being enacted. Income tax changes, for example, have little effect on the consumption/saving of low-income households for the simple reason their income tax liabilities are relatively small. And social security benefit cuts will have minor effects on the young because they lie so far in the future and the young are generally borrowing constrained. On the other hand, eliminating tax-deferred saving will have no effect on current retirees, but greatly influence the spending of the young, since such a policy would relax their borrowing constraints. We also show that a small segment of households would end up raising their lifetime taxes and reducing their lifetime consumption by contributing to tax-deferred retirement accounts. For these households switching to Roth IRAs appears to be advantageous.

## **I. Introduction**

In 2030, the United States will have twice the number of elderly and only 18 percent more workers than is currently the case. There will be enough people 85 and over to fill up all of Los Angeles and New York and enough centenarians to fill up all of Washington, D.C. The reason for this unprecedented aging of America is, of course, the baby boom that occurred between 1946 and 1964 and the baby bust that followed it. The baby boomers number 77 million, and the explicit and implicit claims they hold to future Social Security, Medicaid, and Medicare benefits run in the tens of trillions of dollars. Paying these claims will place the federal government's fiscal finances under enormous stress. In fact, a recent study by Gokhale and Smetters (2003), updated for the new Medicare drug benefit and other policy changes, records a \$51 trillion difference between the present value of the federal government's future expenditure commitments and the present value of its future receipts, where both expenditures and receipts are comprehensively measured.

One way to comprehend the size of our nation's \$51 trillion fiscal gap is to consider the alternative immediate and permanent fiscal policies needed to eliminate it. Four such options are listed in Table 1. The first is raising federal income taxes, personal and corporate, by 78 percent. The second is raising payroll taxes by 108 percent. The third is cutting federal discretionary spending by 114 percent, which, of course, is not feasible. And the fourth is cutting Social Security and Medicare benefits by 51 percent. Suffice it to say that none of these options is pleasant.

The calculations underlying table 1's grim prescriptions are either directly or indirectly based on projections of future expenditures, future receipts, and future age- and sex-specific population counts made by the Social Security Administration, the U.S. Department of the

Treasury, and the Office of Management and Budget. These projections are, if anything, optimistic because they rely on the assumption that baby boomers will die at younger ages than many top demographers believe will be the case.<sup>1</sup> But regardless of the precise fiscal adjustment needed to achieve fiscal sustainability, one thing is clear. The federal government is highly likely to raise taxes as well as cut Social Security and other benefits in future years. This economic reality prompts the following two questions: First, are Americans saving enough to withstand future tax hikes or benefit cuts? Second, should American workers be saving in 401(k) and other tax-deferred retirement accounts given the likely increase in taxes they will face in retirement?

This paper uses *ESPlanner*<sup>TM</sup> -- a life-cycle, financial planning model developed by Economic Security Planning, Inc. -- to examine these questions. *ESPlanner's* saving and life insurance recommendations generate the smoothest possible survival-state contingent lifetime consumption path for a household without putting that household into debt. Such *consumption smoothing* is predicted by economic theory and appears to accord with actual intertemporal consumption preferences. By running households through *ESPlanner* based on current policy as well as on alternative fiscal policies, one can easily compare recommended consumption and saving responses to hypothetical tax and transfer policy changes and assess the degree to which borrowing constraints may be playing a role in determining the size of those responses. One can also use the program to assess alternative retirement saving strategies, specifically the degree to which saving in tax-deferred form lowers lifetime taxes, thereby permitting higher lifetime consumption.

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1 . See, for example, Lee, Ronald and Hisashi Yamagata, 2003. "Sustainable Social Security: What Would It Cost?" *National Tax Journal*, 56(1), part 1. pp.27-43.

The households used in our analysis are drawn from the Federal Reserve's 1995 Survey of Consumer Finances. Our sample consists of 964 married households. This data set provides detailed information on household earnings, assets, housing, demographics, and retirement plans -- all of which is used by *ESPlanner* in formulating its saving and insurance recommendations. The policies we consider are tax hikes, tax cuts, social security benefit cuts, and the elimination of tax-deferred saving. Our analysis distinguishes between immediate and future policy changes as well as between permanent and temporary ones. When it comes to examining the impact of eliminating tax-deferred saving, we set up the experiment such that each household's pre-tax labor compensation is the same whether or not we rule out tax-deferred saving. In the case that we rule it out, we increase worker's pre-tax labor earnings by the amount the employer would otherwise have contributed to his/her retirement accounts.

Our results are influenced by the fact that a majority of our sample of households—58 percent—many of which are young, is borrowing-constrained and, thus, more responsive to current than future policy changes no matter how long their duration. By borrowing constrained we mean that the household is unable to smooth its living standard without incurring additional debt beyond its mortgage. We have set a zero non-mortgage debt limit in running *ESPlanner*, but the results would be quite similar were we to assume that households could borrow up to, say, \$10,000 on their credit cards. While we assume a zero-non mortgage debt limit in running our sample households through the program, the fact that 58 percent of the households can't perfectly smooth their living standards without going into debt represents a finding, rather than an assumption, of our analysis.

The fact that the young are particularly affected by borrowing constraints is not surprising. The young have most of their resources tied up in their future human capital. In addition, they have relatively high “off-the-top” expenditures, the most significant of which is off their mortgage. For the middle-aged, however, only the poorest have a high incidence of binding borrowing constraints. Finally, a relatively small fraction of households with household-heads already retired or close to retiring is borrowing constrained.

Recommended saving rates are highly variable across the sample even holding age fixed. Indeed, they vary much more than the recommended rate of consumption rates out of remaining lifetime resources because saving rates are highly sensitive to temporary changes in income and special expenditures. Consequently, we evaluate the impact of policy changes in terms of consumption rather than saving responses. Recommended consumption rates out of lifetime resources rise from 3 percent at young ages to about 6 percent for retirees. But there is considerable variability in these rates holding age fixed, particularly for younger and low-income households, thanks to the presence of binding borrowing constraints.

Our results are also very sensitive to the particular policy being enacted. Income tax changes, for example, have little effect on the consumption/saving of low-income households for the simple reason their income tax liabilities are relatively small. And social security benefit cuts will have minor effects on the young because they lie so far in the future and the young are generally borrowing constrained. On the other hand, eliminating tax-deferred saving will have no effect on current retirees, but greatly influence the spending of the young, since such a policy would relax their borrowing constraints.

The paper also shows that a significant proportion of households — almost 30 percent — face higher marginal income tax rates during retirement than during their working years. This

reflects, in large part, the taxation of Social Security benefits under the federal income tax. Indeed, thanks, in large part, to this form of taxation, about 10 percent of our sample households appear to face a tax trap associated with additional contributions to tax-deferred retirement accounts. Such households would do better investing in Roth IRAs.

On the other hand, redirecting employee and employer contributions into Roth-type accounts would not necessarily benefit all households. Participating in Roth plans implies higher taxes when young and, if the household is borrowing constrained, lower current consumption. Since both spouses may die prior to retirement, there is no guarantee that the reduction in current consumption will be offset by higher future consumption.

The significant heterogeneity in consumption/saving responses to policy changes depending on the ages and resource levels of the households in question and the particular policy undertaken makes it difficult to summarize our quantitative findings apart from saying that each of the policies considered has a quite sizeable impact on the current consumption and saving behavior of a substantial subset of our sample.

Our paper is organized as follows. The next section briefly discusses some related research. Section III describes ESPlanner and discusses its strengths and weaknesses with respect to understanding consumption and saving responses to policy changes. Section IV introduces the data set, explains our sample selection criteria, and details our data imputations. Section V presents results, and section VI concludes with recommendations for future research.

There are a variety of different and seemingly disparate results in this study. First, we demonstrate that close to three-fifths of all sample households and over four-fifths of young sample households are borrowing constrained as measured by their inability to perfectly smooth their living standards without going into debt either immediately or at some point in the future.

Next we show that these constraints materially influence how much our sample households should consume and save in the present. We do so by examining how recommended consumption rates (defined as current recommended consumption divided by the present value of lifetime consumption) differ by age and lifetime resources as measured by the present value of lifetime consumption. Were borrowing constraints immaterial all households with heads of a given age and with the same demographic composition (numbers and ages of children and spouses) would have the same recommended consumption rates, regardless of their timing of their future resources. But we show that there is a very large dispersion in age-specific consumption rates that is not explained by demographics.

Understanding at the outset the ubiquity and magnitude of borrowing constraints is critical to assessing our second set of findings, which details how our sample households should respond to the likelihood of future fiscal adjustments. The answers depend very sensitively on the particular type of fiscal adjustment being contemplated. Because so many households in our sample are borrowing constrained, future fiscal policies, such as a future tax hike or a future benefit cut, have relatively small effects on the recommended current consumption and saving of many of our sample households. Those households that should respond the most to such future policies are those that are older and have greater lifetime resources. We demonstrate this in the paper's third set of findings.

The paper's fourth set of findings concerns the form in which households should save, specifically whether they should save in tax-deferred form, in Roth IRAs, or in regular asset accounts. Borrowing constraints are central to this issue for two reasons. First, saving through retirement accounts greatly exacerbates borrowing constraints. Second, saving through retirement accounts dramatically alters households' intertemporal allocations of consumption

expenditures, which, in turn, dramatically affects their regular asset positions and the taxes they pay on regular capital income when young and old. Stated differently, households that contribute or have their employers contribute significantly to retirement accounts and are borrowing constrained will end up in old age with much more in the way of taxable regular asset income than would otherwise be true. This increase in taxable income in old age, together with the large taxable withdrawals from retirement accounts, can push some households into significantly higher federal and state income tax brackets, trigger taxation of social security benefits, and convert tax-deferred saving from a lifetime tax haven into a lifetime tax trap.

## **II. II. Related Research**

Together with a number of co-authors, we have used ESPlanner in previous studies to examine the adequacy of saving and life insurance holdings. The term *adequacy* is used here with reference to the ability of households to maintain their living standards through time and in the event of the death of a household head or, if married or partnered, the death of her/his spouse or partner. This definition of saving and insurance adequacy was adopted in early work on saving and insurance adequacy by Kotlikoff, Spivak, and Summers (1982) and Auerbach and Kotlikoff (1987, 1991). Each of these studies suggested that a significant fraction of American households either over-spend, under-insure, or do both when it comes to preserving their living standards in future states of nature. More recent studies by Bernheim, Carman, Gokhale, and Kotlikoff (2002), Bernheim, Berstein, Gokhale, and Kotlikoff (2002), and Bernheim, Forni, Gokhale, and Kotlikoff (2003) report very similar results. The data sets used in these recent studies are the 1995 Survey of Consumer Finances, the Health and Retirement Study, and a 2001 sample of Boston University employees. In Bernheim, Forni, Gokhale, and Kotlikoff (2003),

which uses the same Survey of Consumer Finances (SCF) examined here, the focus is on life insurance holdings rather than on saving adequacy and effectiveness – the issues raised here.

Of the studies cited, the one by Bernheim, Berstein, Gokhale, and Kotlikoff (2002) is unique in that it doesn't employ a public-use data base, but rather represents a case study in which close to 400 Boston University employees were taken through *ESPlanner*. Since the program determines actual saving and consumption in the course of soliciting its requisite data, the study provides the opportunity to compare actual with recommended consumption and saving behavior. The study shows that younger households tend to undersave and older households tend to oversave relative to *ESPlanner's* recommendations. The discrepancies between actual and recommended saving are often quite large. There are also significant differences between *ESPlanner's* insurance recommendations and actual insurance holdings. There are a number of possible explanations for these discrepancies, but the one we feel is most important is that determining the appropriate consumption smoothing plan, and with it, the right amounts to save and insure, is extremely difficult. Even small mistakes in assessing one's future taxes or Social Security benefits or in properly discounting future income flows can lead to major mistakes in deciding how much to save and insure.

Carman, Gokhale, and Kotlikoff (2003), on which this report draws, also examined the 1995 SCF, but with the goal of studying household consumption responses to tax cuts and other fiscal policy changes. In the course of considering this issue, the authors discovered that a majority — 57 percent — of their SCF sample is borrowing-constrained. This fact is important for considering how much households should currently be saving and how their current saving should respond to the prospects of future tax hikes and spending cuts. Liquidity constraints are also highly relevant to the question of saving efficacy. Households that are liquidity constrained

may find that contributing to retirement accounts dramatically limits their ability to smooth their living standards through time. Such contributions, by changing the age-pattern of taxable income, can also trigger increases major changes in lifetime tax payments.

The common view is that deferring income taxation by contributing to 401(k) plans, 403(b) plans, IRAs, Keogh plans, SEP plans, and other tax-deferred accounts will reduce lifetime tax payments by, in effect, allocating more of one's taxable lifetime earnings to future years when tax rates are lower. However, as Gokhale and Kotlikoff (2003) point out, making significant contributions to tax-deferred accounts can actually raise the lifetime net taxes of low- and middle-income workers. The reasons here number three. First, low- and middle-income workers who contribute at or close to the legal maximum may find themselves in higher tax brackets in retirement as a result of accumulating, and consequently withdrawing, so much from their tax-deferred retirement accounts. Second, large withdrawals of tax-deferred assets in retirement can trigger federal income taxation of Social Security benefits, since these benefits become taxable when taxable income passes a nominal threshold. Third, the government can and surely will raise tax rates in the future to deal with the demographic transition. This third consideration is relevant to high-income workers as well as low-income workers. But the first two points are not. The reason is that high-income workers will invariably be in the highest tax bracket and experience social security benefit taxation retirement regardless of the extent of their tax-deferred saving.

### **III. *ESPlanner***

*ESPlanner* uses a patented dynamic programming algorithm to smooth a household's living standard over its life cycle to the extent possible without allowing the household to go into

debt. In making its calculations, *ESPlanner* takes into account the non-fungible nature of housing, bequest plans, economies of shared living, the presence of children under age 19, and the desire of households to make “off-the-top” expenditures on college tuition, weddings, and other special expenses. In addition, *ESPlanner* simultaneously calculates the amounts of life insurance needed at each age by each spouse to guarantee that potential survivors suffer no decline in their living standards compared with what would otherwise be the case.

*ESPlanner's* calculates time-paths of consumption expenditure, taxable saving, and term life insurance holdings in today's dollars. Consumption in this context is everything the household gets to spend after paying for its “off-the-top” expenditures – its housing expenses, special expenditures, life insurance premiums, special bequests, taxes, and net contributions to tax-favored accounts. Given the household's demographic information, preferences, and borrowing constraints, *ESPlanner* calculates the highest sustainable and smoothest possible time-path of the household's living standard, which leaves the household with zero terminal assets apart from the equity in unsold homes.

The amount of recommended consumption expenditures needed to achieve a given living standard varies from year to year in response to changes in the household's composition. It also rises when the household moves from a situation of being borrowing constrained to one of being unconstrained. Finally, recommended household consumption will change over time if users intentionally specify that they want their living standard to change.

*ESPlanner's* algorithm took almost a decade to develop and refine. While the algorithm is complicated, it's easy to check *ESPlanner's* the reports to see that, given its inputs, *ESPlanner* does, indeed, recommend the highest and smoothest possible living standard that the household can sustain over time without going into debt. Checking here refers to confirming that the

household's terminal net worth is zero, that its net worth is never negative (or never falls below minus the specified positive borrowing limit), that the level of adult-equivalent consumption is either constant through time or rises as borrowing constraints become relaxed, and that survivors can afford the same living standard as they would have enjoyed had neither spouse died prior to reaching his and her maximum ages of life.

Since the taxes paid by households depend on their total incomes, which include asset income, how much a household pays in taxes each year depends on how much it has consumed and saved in the past. But how much the household can consume and, therefore, how much it will save depends, in part, on how much it has to pay in taxes. Thus taxes depend on income and assets, which depend on taxes. This simultaneity means that the time-paths over the household's life cycle of consumption, saving, and tax payments must be jointly determined. *ESPlanner* achieves this simultaneous and consistent solution not only with respect to consumption and saving decisions, but also with respect to the purchase of life insurance.<sup>2</sup>

Because taxes and Social Security benefits make a critical difference to how much a household should consume, save, and insure, casual calculations of these variables is a prescription for seriously misleading financial recommendations.<sup>3</sup> As mentioned, *ESPlanner* has highly detailed federal income tax, state income tax, Social Security's payroll tax, and Social Security benefit calculators. The federal and state income-tax calculators determine whether the household should itemize its deductions, computes deductions and exemptions, deducts from taxable income contributions to tax-deferred retirement accounts, includes in taxable income

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<sup>2</sup> The program not only calculates the appropriate levels of life insurance at each age for each spouse when both are alive. It also determines how much life insurance each surviving spouse needs to purchase.

<sup>3</sup> See Gokhale, Jagadeesh, Laurence J. Kotlikoff, and Mark Warshawsky, "Comparing the Economic and Conventional Approaches to Financial Planning," in Laurence J. Kotlikoff, *Essays on Saving, Bequests, Altruism, and Life-Cycle Planning*, Chicago, Ill.: University of Chicago Press, NBER volume, 2001, 489-560.

withdrawals from such accounts as well as the taxable component of Social Security benefits, and calculates total tax liabilities after all applicable refundable and non refundable tax credits.

These calculations are made separately for each year that the couple is alive as well as for each year a survivor may be alive. Moreover, *ESPlanner's* survivor tax and benefit calculations for surviving wives (husbands) are made separately for each possible date of death of the husband (wife). I.e., *ESPlanner* considers separately each date the husband (wife) might die and calculates the taxes and benefits a surviving wife (husband) would receive each year thereafter.

To repeat the point made above, in running the program, we assume that households can not go into debt apart from holding and paying off the mortgages they currently report. In addition, the program ensures that the household makes it to its maximum age of life with enough resources to maintain its living standard. I.e., the program does not permit the household to end up in debt if it lives a lot longer than its life expectancy would suggest. Stated differently, the program, in assuming households plan to live to their maximum age of life, rather than to their expect age of death, treats households as highly risk averse with respect to spending down their resources. This seems to us to be a reasonable assumption given actual behavior.

### ***Solution Method***

The dynamic programming used in *ESPlanner* differs from traditional dynamic programming in several respects. First, the software, which was developed by the authors, actually features two dynamic programs – one that calculates consumption/saving decisions subject to borrowing constraints, and one that calculates life insurance recommendations. Second, each program passes data to the other; i.e., the output of one program represents the input to the other. Third, finding a solution for the interrelated consumption-saving, and

insurance problems requires iterating between the two programs until a fixed point is achieved with the following property: Using the output of one dynamic program (call it A) as input to the other (call it B) lead to output from program B which, when passed as an input to program A generates the same output as was initially inputted into program B. The same must, therefore, be true with respect to output of program B. This patented Gauss-Seidel solution of mutually interdependent dynamic programs is unique in the literature.<sup>4</sup>

The inputs and outputs referred to here are survivor-state contingent time paths of decision variables—survivor state-contingent consumption-saving and insurance purchases. They also include other variables such as survivor-state contingent asset incomes, federal and state income taxes, and insurance premiums, which are updated at each iteration to reflect the latest updated “guess” of consumption-saving and insurance purchases for every survivor contingency in each period. Hence, when the program reaches a fixed point for the path of survivor-contingent decision variables (consumption-saving and insurance purchases), it will have reached a fixed point as well on survivor-contingent asset incomes, federal and state income taxes, and insurance premiums. Stated differently, when the program converges it converges simultaneous on all the time paths of all variables -- consumption, saving, insurance purchases and premiums, assets, and federal and state income taxes.

Two additional questions about *ESPlanner's* convergence algorithm are worth posing. First, does it always converge? Second, is the solution it finds to any given case unique? The answer to the first question is that we've now run the program on thousands of cases with hypothetical and real-world households and have never encountered problems with

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<sup>4</sup> Indeed, Economic Security Planning, Inc. was awarded a patent by the U.S. Patent Office for its software, including its dynamic programming methodology.

convergence.<sup>5</sup> The answer to the second question is that although we don't have a formal proof of uniqueness, we have never encountered a case with convergence to multiple solutions, and the mathematics of the problem very strongly suggests a unique solution.<sup>6</sup>

### ***Using ESPlanner to Describe Actual Behavior***

An obvious question to pose at this juncture is whether *ESPlanner*, which was designed for prescriptive purposes, is useful as a descriptive tool, specifically one that tells us how households might change their savings in response to fiscal policy changes. As described in Bernheim, Berstein, Gokhale, and Kotlikoff (2002), Bernheim, Carman, Gokhale, and Kotlikoff (2003), and Bernheim, Forni, Gokhale, and Kotlikoff (2003), the correlation between *ESPlanner's* recommended saving and life insurance holdings and actual saving and life insurance holdings is very low.

On the other hand, the mistakes, if one accepts that term, that households appear to be making are not systematic. Not all households are buying too little or too much life insurance. Nor are all households either under- or oversaving. Indeed, median behavior seems to accord with median recommendations. Hence, if one is trying to understand how the typical household's consumption and saving would respond to major fiscal changes, the changes in *ESPlanner's* recommended levels of those variables may be a reasonable starting point.

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5 This includes runs made by commercial purchasers of *ESPlanner*.

6 The potential for non-uniqueness arises from the endogeneity of taxes to consumption choices. If total taxes were highly sensitive to asset income, one could conceive of low levels of consumption when young leading to very high levels of taxes when old that would justify low levels of consumption when old as well. On the other hand, with such a super sensitive tax function, high levels of consumption when young would generate very low taxes when old and permit high consumption when old. Any proof of uniqueness would need to be presented on a case-by-case basis since the tax function is dependent on each household's demographics, age-earnings profile, and other circumstances. But the same quite extreme requirement for non-uniqueness would apply in each case, namely that increasing the present value of consumption by a dollar by raising consumption by the same percentage in each survivor-contingent state leads to more than a one dollar reduction in the present value of taxes.

One should also bear in mind that *ESPlanner's* recommendations are consistent with maximization of the most commonly posited intertemporal preference structure, namely isoelastic preferences. The one caveat here is that *ESPlanner's* implicit isoelastic preference structures assume that the intertemporal elasticity of substitution is very close to zero. Stated differently, *ESPlanner* planners implicit preferences exhibit very high risk aversion (they approach Leontief), which implies the equalization across time, to the extent permitted by borrowing constraints, of consumption per equivalent adult.<sup>7</sup>

The strong desire to equalize living standards across periods means that policy changes have only income effects in the model. This may lead to an overstatement of the absolute size of consumption changes associated with fiscal policies that raise or lower intertemporal terms of trade. For example, tax cuts that lower the net price of consuming in the future relative to the present will engender an income effect that raises current consumption, but a substitution effect that lowers current consumption. *ESPlanner* assumes there are no such substitution effects.

Although this choice was made for computational convenience and to make the results of *ESPlanner* as easily understood as possible to general users, there is solid empirical evidence supporting this formulation. Hall (1991) reviews this evidence, arguing that the intertemporal elasticity of substitution with respect to consumption is very small, if not zero.

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<sup>7</sup> The program does include an age-specific standard of living index that allows users to change their living standard through time, but for purposes of this study we assume there is no desired change in living standard as the couple ages. The living standard index can be thought of as age-specific time preference factors multiplying each period's isoelastic utility.

#### IV. The Data, Sample Selection, and Imputations<sup>8</sup>

The 1995 wave of the SCF was fielded between June and December 1995. Over those six months, the Federal Reserve surveyed over 4000 households. Like previous waves of the SCF, the 1995 wave over-sampled the wealthy.<sup>9</sup> The data collected cover demographics, income, wealth, debt and credit, pensions, attitudes about financial matters, the nature of various transactions with various types of financial institutions, housing, real estate, businesses, vehicles, health and life insurance, current and past employment, current social security benefits, inheritances, charitable contributions, education, and retirement plans. The architects of the SCF data files imputed missing information, supplying five “implicates” for each household.<sup>10</sup> We use the first implicate.

The major shortcoming of the SCF for our purposes is its failure to record what households are actually saving and consuming. Consequently, we are not in a position to compare ESPlanner’s consumption and saving recommendations with actual choices of those variables. This is why we focus here on a) what households *should* be consuming and saving, b) how household consumption and saving *should* respond to policy changes, and c) the form in which households *should* save.

##### *Sample Selection*

Our final sample consists of 964 couples. We focus on couples because of the fact that they are likely to be in more stable living arrangements compared with singles. From the original observation count of 2874 married couples, we excluded couples for the following

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<sup>8</sup> This section draws heavily on Bernheim, Carman, Gokhale, and Kotlikoff (forthcoming 2003).

<sup>9</sup> The SCF sampled 2,874 married couples and 1,425 single individuals.

<sup>10</sup> Kennickell (1991) provides a description of the imputation procedure.

reasons: a) a spouse was self employed or owned and actively managed a business (59.4 percent of excluded observations); b) a spouse was temporarily unemployed or both spouses were students or temporarily laid off (7.9 percent); c) neither spouse had regular earnings as an employee (15.6 percent); d) labor earnings were defined in terms of a unit other than time worked, for example by the piece (0.5 percent); e) mortgage information was inconsistent (7.1 percent); f) property taxes were greater than 5 percent of the value of the home (1.3 percent); g) a spouse was over the age of 85 (1.3 percent); Household head was aged 24 or younger (3.3 percent) or h) the couple's reported income and other economic resources were insufficient to support its reported fixed expenditures (3.7 percent).<sup>11</sup>

### ***Data Imputations***

#### **Non-Asset Income**

Our calculations require data on each spouse's past and future covered earnings as well as future total (covered and uncovered) earnings. We assume that all future earnings are covered under Social Security for purposes of determining payroll taxes and computing Social Security benefits. For respondents who were working at the survey date, we have 1995 self-reported labor earnings. In order to impute past and future earnings we use a model that assumes that the cross section age-earnings profile for fully employed workers remains constant through time. We allow real wages for all ages to grow over time, using the historic Social Security real wage growth for past years, and a 1 percent overall real wage growth factor for future years. This is a conservative assumption about future real wage growth for some households because it doesn't take into account career-related earnings growth. But we have found that actual users of

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<sup>11</sup> Note that some households fall into more than one category.

*ESPlanner* make quite conservative estimates of their future earnings growth as a way of, indirectly, adjusting for the uncertainty associated with their future earnings.

In estimating past Social Security covered earnings, we assume that the first year of employment is the maximum of 1951 and the year the person was age 22.<sup>12</sup> Households where one of the spouses was temporarily not working, as opposed to out of the labor force, were dropped from our sample.

The SCF provides information on other kinds of non-asset income. We treat some of these income sources, such as Veteran's Benefits, SSI, disability income, welfare, child support, and regular help from friends or relatives, as non-taxable. Except for Social Security disability income and child support, we assume these income streams continue, with full adjustments for inflation, until the respondent's death. Social Security disability income is assumed to end at age 62, when the recipient becomes eligible for Social Security retirement benefits. We divide child support received by the number of children to obtain child support per child and assume it is received until the child in question reaches 18.<sup>13</sup> We treat other kinds of special receipts, such as income from trust funds and royalties, as taxable. We assume they will be received for ten years beyond the survey date, and that the payments will be constant in nominal terms. Relatively few respondents receive these kinds of income flows, and the amounts are generally small relative to average earnings. We assume that SCF respondents retire at their stated intended ages of retirement or age 70, whichever is smaller. For those who fail to say when they will retire, we use age 65.

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<sup>12</sup> For workers who were under 22 in 1995, we assume that 1995 was their first year of employment.

<sup>13</sup> The HRS reports only the sum of child support and spousal support. However, we confine our attention to couples, 98 percent of which are married. Since spousal support generally ends upon remarriage (and also declines somewhat on average when individuals become unmarried partners), we can safely assume that the entire reported amount is child support.

## Pension Plans, Retirement Accounts, and Social Security

The SCF provides information on nominal benefits currently received from defined benefit pension plans as well as expected nominal benefits for future pension recipients. We assume that all pensions are 50 percent indexed to inflation and that a surviving spouse would receive 100 percent of the monthly benefit or lump-sum distribution. We further assume that employer-sponsored defined contribution plans and all private retirement accounts (IRAs and Keoghs) provide for tax-deductible contributions and tax-deferred accumulation. Contributions in all future years up to age 59 are set equal, in real terms, to contributions in the survey year. If total contributions are greater than the legal limits (\$30,000 or 25% of income) contributions are truncated. The proportion given by the employer remains constant. Any contributions (by the employee or the employer) over the legal limit are included in employee non-deductible and tax-favored contributions.

The SCF contains information on IRA account balances, but not annual contributions. We impute contributions based on Tobit regressions from the Consumer Expenditure Survey. Contributions are calculated as a function of marital status, work status, age, earnings, and family size.

If an individual is already receiving Social Security benefits, we assume that benefits have already started. Otherwise, we impute the initial age of benefit receipt as follows. If the individual is still working, we assume that benefits will start at his or her projected retirement age (but not earlier than age 62). If the individual is retired, we use the reported start date for those currently receiving benefits, for those not yet receiving benefits we assume benefits will start at age 62 for those currently under 62, and at the current age for those over 62. In all cases,

the initial age of benefit receipt is between 62 and 70. For respondents currently receiving social security disability benefits, we assume that they switch to retirement benefits at age 62. Our calculations also require information on the age at which individuals begin to receive private pension benefits. For those not yet receiving benefits, we use the age at which the individual expects benefits to begin, as reported in the SCF.

Individuals with previous marriages lasting more than ten years and ending in divorce or separation and individuals with previous marriages lasting more than nine months and ending in the spouse's death are eligible to receive Social Security benefits based on the earnings history of their prior spouse. This presents us with a problem, since we do not have any information about prior spouses. We assume that all such individuals receive benefits based on either their own earnings history or that of their current spouse.

### Housing

Our calculations require information on a variety of specific housing expenditures, including mortgages, home insurance premiums, property taxes, and other recurring expenses. Association fees, homeowner or condo/coop/townhouse association fees and rent on the site for households owning and living in mobile homes are added to home insurance premiums to form recurring house expenditures. When households own part of a farm, they are classified as homeowners. The rent they pay is then also added to their home insurance premium to ensure that we are capturing all housing expenses. While the survey does not contain information on

homeowner insurance premiums, it does include the face amount of insurance. We imputed annual home insurance premiums by multiplying the face values by 0.0025.

If the mortgage payment (minus property taxes and insurance premium if respondent states these are included in their payments) is negative then the observation is dropped. If the annual property tax is greater than 5 percent of the home value the observation is dropped. With regards to mortgages, the SCF reports the balance remaining, the number of years remaining, the interest rate, and the payment. In order to ensure consistency, we imputed the balance remaining on the mortgage based on the years remaining and the interest rate and payment.

In some instances, rental payments reported in the sample include heat and electricity expenses; in such cases, respondents were not asked separately about these utility payments. We apportion the reported number into separate components by assuming that the ratio of rent to utilities is the same for these respondents as the average ratio computed from the Health and Retirement Study. If rent includes all utilities, rent is set to 0.77 times the amount of rent. If rent includes some utilities, rent is set to 0.89 times the amount of rent. We have no information on utility expenditure if it is not included in rent. The SCF does not include any information concerning property taxes paid on second homes. We assume that this property is taxed at the same rate as the primary home. Finally, we set monthly rental payments equal to zero for the few respondents who report that they live in a house or apartment that they neither rent nor own. In addition, we assume that all households plan to remain in the same house before and after retirement. This is consistent with the assumption made by virtually all actual *ESPlanner* users. Actual users appear to want to plan to maintain their housing standards as well as their living standards. Also, many users view the equity in their homes as a safety net and don't consider selling/downsizing their homes for that resource.

## Other Variables

For confidentiality reasons, the SCF does not report the respondent's date or month of birth or state of residency. We assume that each respondent was born on the fifteenth of June. For the purposes of computing state taxes, we use Massachusetts law. We set the maximum age of life to 95 for all individuals. Many households have adult children living with them. For the purposes of this project, only children 18 or under are included.

We assume for all respondents a fixed amount for funeral expenses which is set equal to the median of the reported expenses (\$5000) for HRS spouses for spouses actually died in 1991 (90 observations). The HRS reports information on actual funeral expenses and legal fees of deceased spouses. We set intended bequests equal to zero.

The SCF allows mortgages to end with a balloon payment. When there is a balloon payment, we assume that they refinance for the amount of the balloon payment with a 15-year mortgage (8% interest rate). There is no space in ESP for future mortgages so these are included in special expenditures. Interest payments on the first home are included in deductible special expenditures. Payments on the balance are included in non-deductible special expenditures. Non-deductible special expenditures also include child support or alimony payment and support to other family members. These are assumed to be paid in the current year and the next four years (a total of 5 years). Non-deductible special expenditures also include child support or alimony payment and support to other family members. These are assumed to be paid in the current year and the next four years (a total of 5 years).

As a measure of a household's net worth, we use total non-housing assets minus total non-housing liabilities. Total non-housing assets include checking and saving accounts, money

market funds, CDs, government saving bonds, T-bills, stocks, mutual funds, investment trusts, business equity, bonds, bond funds, real estate other than primary and vacation homes, the cash value of life insurance policies, and some miscellaneous items. Total non-housing liabilities include personal loans, student loans, credit card balances, car loans, installment loans, and other non-housing debt. Housing debt (mortgages and equity lines of credit) are considered separately (see above). We assume that, apart from mortgages and other outstanding housing debt, households cannot borrow against future income. We further assume a 3 percent rate of inflation and a 3 percent real pre-tax rate of return. Finally, we set our couples' borrowing limits to zero and tell *ESPlanner* to maintain a constant living standard over time for all household members, regardless of the survivorship states, provided this does not violate the household's zero debt constraint.

## **V. Findings**

Table 2 records numbers of observations after all the above-enumerated sample selection criteria have been applied. These counts as well as other results are cross-classified by the age of the household head and the present value of remaining lifetime consumption expenditure. Consumption is defined here and elsewhere to include housing consumption. In the case of couples that rent, housing consumption is measured as annual rental payments and non-rental expenses. In the case of couples that own their homes, housing consumption is measured as the sum of imputed annual rent plus homeowner's insurance, property taxes, and maintenance expenses. Imputed rent, in turn, is measured as 6 percent of the value of the home reflecting an assumed 3 percent real return on comparable safe investments and a 3 percent annual depreciation rate.

The *present value* of consumption refers to the actuarial present value of what the couple can expect to consume given the chances that one or both spouses will die prior to her or his maximum age of life. To form these present values we apply state-specific survival probabilities to consumption in each survivor state, where a survivor state is defined not only by the year and age of the survivor, but also by the age at which the spouse died. Hence, the present value of consumption is a comprehensive measure of each sample couple's expected remaining lifetime resources.

Returning to the table, note that of our 964 observations, most have lifetime consumption values ranging from \$500,000 to \$2 million. Thanks to the survey's over-sampling of the wealthy, there are 60 households with present values of consumption in excess of \$4 million. The majority of the sample – 78.1 percent -- is under age 55. Those aged 65 to 74 represent 7.3 percent of the sample.

### ***Borrowing Constraints With and Without Retirement Account Contributions***

Table 3 repeats table 1, but counts only borrowing-constrained observations. Overall 58.4 percent of our sample of households is borrowing constrained. Borrowing constraints are much more prevalent among younger households. For example, 84.7 percent of the households whose heads are age 25-34 are borrowing constrained, but only 14.3 percent of those 65 to 74 are so constrained. Even lifetime-rich young households are borrowing constrained. Indeed, 20 of our 27 observations of 25-34 year-old households with a present value of consumption above \$2 million are borrowing constrained. This reflects the fact that lifetime rich young households, like lifetime poor young households, have relatively little fungible wealth relative to their human capital, virtually none of which can be used to finance current consumption.

The picture differs somewhat for households with heads aged 45-54. A total of 15 out of 17 of these households with \$0-\$500 thousand in present value of consumption are borrowing constrained. However, of the 63 households whose heads are aged 45-54 and whose present value of consumption exceeds \$2 million, only 14 are borrowing constrained. This pattern is to be expected. For low-income households future Social Security benefits are relatively large compared with current labor earnings. As Gokhale, Kotlikoff and Warshawsky (2004) demonstrate, such households may have neither the ability nor need to accumulate significant savings by middle age. Nevertheless, they cannot borrow against their future Social Security benefits to help smooth their living standards.

Table 4 considers the role of retirement account contributions, by both sample respondents and their employers, on the degree to which the sample is borrowing constrained. Specifically, the table shows the number of households that would continue to be borrowing constrained were their defined contribution and other retirement account contributions eliminated and were their employers to pay their matching contributions directly in the form of higher pre-tax wages. This change has a modest impact on the number of young households that are borrowing constrained. For example, 64.3 percent of households with heads aged 25-34 remain borrowing constrained—as against 84.7 percent of the sample in the base case. The big impact is on those ages 35 to 54. Here the number of households that are constrained falls from 319 to 147 or from 61.0 percent of all households in this age range to 28.1 percent. Clearly, many households seem to be sacrificing current consumption in order to continue making their own and their employers' contributions to their retirement accounts.

## ***Consumption Rates***

Tables 5 through 7 provide a measure of *ESPlanner's* recommended consumption and saving behavior. The figures in these tables are *consumption rates* – defined as the average ratio, in a given age bracket, of recommended consumption to the present value of lifetime consumption. These consumption rates can also be thought of as the program's average recommended propensities to consume out of remaining lifetime resources since the present expected value of consumption is quite close in value to the present value of remaining lifetime resources.

The idea in presenting these consumption rates is to show how fast *ESPlanner* recommends that households expend their consumption power. This measure of consumption behavior is an alternative to current saving rate measures, which are highly sensitive to how one defines current income.

According to the life cycle model, we'd expect these consumption-spending rates to rise with age, which they certainly do in Tables 5 through 7. Consider, in this regard, table 6, which shows median consumption rates. These rates almost double as one moves from ages 25-34 to 65-74. Also note that the poorer young and middle-aged households have lower consumption rates than those of the same age, but with higher levels of lifetime consumption. This reflects the fact that poor/young couples are more often borrowing constrained than are rich/older couples.

We can further explore the issues of borrowing constraints by comparing the minimum and maximum consumption rates presented in tables 5 and 7 with the median rates presented in table 6. Were borrowing constraints non-binding and were there no differences in the number and ages of children as well as the ages of spouses, we'd expect all consumption rates to be the same at a given age regardless of the household's level of resources. But as a quick comparison

of tables 5 and 7 indicate, minimum consumption rates are much lower and maximum rates are often considerably higher than the median rates. Table 8 shows the difference between maximum and minimum consumption rates. For the poorest households, the difference generally exceeds 2 percentage points and declines gradually but unmistakably as the present value of consumption rises—the difference is less than 2 percentage points for richer households, in general. Hence, the differential impact of binding liquidity constraints on consumption rates for poor versus rich households is evident despite the considerable sampling variation in households' economic and demographic circumstances.<sup>14</sup>

Table 9 examines the issue of borrowing constraints from a different perspective. It displays the median current consumption rates that would arise were households able to borrow as much as they needed to smooth their living standards. For some cells the differences in the consumption rates in table 9 and those in table 6, which displays median consumption rates with borrowing constraints, are substantial. Take households age 25-34 with \$500,000 to \$750,000 thousand in lifetime consumption. The table 9 consumption rate is 3.88 compared with 3.02 in table 6—a difference of 0.86 percent. The difference declines considerably for households with older heads and with higher lifetime earnings as borrowing constraints are neither as prevalent nor as significant for such households.

Table 10 provides another way of looking at borrowing constraints, particularly their interaction with retirement account contributions. The table shows the median percentage change in households' recommended levels of consumption that would arise from a) eliminating

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<sup>14</sup> The biggest differential occurs in the case of households whose heads are aged 45 through 54 and whose present value of consumption lies between \$2 million to \$4 million. This large difference is driven by one observation with a minimum consumption rate of 0.69 percent. The corresponding maximum rate of 5.41 percent does not seem anomalous when compared to the maximum rates for neighboring cells. The observation with the lowest consumption rate has a particularly strongly binding borrowing constraint that makes its current consumption extremely low relative to the present value of its consumption.

retirement account saving and b) raising households' labor income by the amount of their employers' retirement account matching contributions. For young households with low to moderate levels of lifetime consumption median recommended consumption rises, with the largest increase in the median being 16.3 percent among age 25-34 households with \$250,000 to \$500,000 in lifetime consumption. For older households and for those with higher lifetime earnings, median recommended consumption rates fall—reflecting the loss from non-participation in tax-favored saving plans. However, the reductions are small for such households.

### ***Current Saving Rates***

Tables 11-13 complement the consumption-rate analysis by showing *ESPlanner's* recommended current saving rates for the sample. The income used to form the denominator of this saving rate includes all household gross earnings, imputed rent on home equity, Social Security and other transfer benefit receipts, net of all taxes. Recommended current saving itself is measured as income less recommended spending, which includes consumption, insurance premiums, housing expenditures, retirement account contributions, and tax payments.

The key feature of tables 11-13 is the incredibly large heterogeneity in recommended saving rates across households. Take the 133 households aged 35-44 with \$1 million to \$2 million in present value consumption. The minimum saving rate in this cell is -41.3 percent. The median is -9.7 percent. And the maximum is 53.5 percent. Across the entire sample, recommended saving rates range from -968.5 percent to 323.8 percent.

We discuss these two cases in detail to communicate the logic underlying such extreme saving recommendations generated by *ESPlanner*. In the first case—which generates a

recommended saving rate of -968.5 percent—the household is retired with no significant income relative to its massive net worth of \$173 million. This household essentially spends down its wealth at a rapid rate reflecting its large but negative recommended saving rate out of non-asset income. The other extreme case—which generates a very high recommended saving rate of 323.8 percent—is also a high earning household. This household has initial assets of \$11 million, but also has income from trust funds and royalties of \$1.7 million that ceases after 10 years. Smoothing consumption while receiving high, but temporary income results in a very high recommended saving rate.

There is also a tremendous amount of variation in median saving rates by level of lifetime consumption. Recommended saving rates are quite high for relatively younger households and those with low lifetime resources. For example, the median saving rate for the 18 households aged 35-44 and consuming \$250,000 to \$500,000 in present value stands at 30 percent. It declines to 11 percent for the 13 households aged 65-74 having the same present value of consumption. For households whose present value consumption ranges between \$1 million and \$2 million, the recommended saving rate for the youngest households is very low—3.6 percent. This reflects the fact that the resources of such households primarily consist of human wealth with higher earnings projected to occur in the future. However, older households in this same lifetime consumption range need to spend down their net worth during their retirements in order to smooth their consumption. In this category of resources, recommended saving by age shows a humped shape—middle-aged households have the largest recommended saving rate in preparation for retirement. Although such a pattern of recommended saving rates seems reasonable, it is not seen at all lifetime resource categories. For example, recommended saving rates exhibit a declining trend by age for households with lower lifetime resources.

The enormous heterogeneity in recommended saving rates relative to that in recommended consumption rates begs the question of whether discussing saving behavior in terms of consumption rates and consumption responses to policy changes makes more sense than doing so using saving rates. Certainly, these saving rate findings do not permit a saving-rate policy prescription such as “Middle-aged households should save X percent of their incomes.” The results in tables 11-13 suggest that to smooth their living standards some households need to dissave as much as 9 times their current income, while others need to save up to 3 times their current income. In the sections that follow, we focus on percentage changes in current consumption rather than on changes in saving rates in assessing how Americans should respond to current or future tax hikes or Social Security benefit cuts.

### ***How Should Americans Respond to Current or Future Tax Hikes?***

Tables 14 through 16 show median percentage changes in recommended consumption levels within each age-present value of consumption cell arising from three alternative increases in income taxes. Table 14 shows the impact of raising federal income taxes immediately and permanently by 30 percent; table 15 shows the impact of raising those taxes immediately by 30 percent, but only for 5 years; and table 16 shows the impact of increasing federal income taxes permanently by 30 percent, but starting after 10 years. Table 14 shows that the optimal consumption response to an immediate and permanent 30 percent tax hike ranges from essentially zero for most low lifetime consumption cells to a roughly 10 percent reduction for high lifetime consumption cells. For middle aged and middle income households recommended median consumption falls from between 2 and 7 percent.

The biggest impact of a 30 percent federal income tax hike would arise when the hike is immediate and permanent. If it is temporary—as shown in table 15 -- the impact on consumption rates is smaller. For middle-income households, the reductions are now under 2 percent with only a few exceptions. For the highest earners, the temporary tax hike causes a much smaller reduction in consumption—between 2 and 3 percent—relative to a permanent income tax hike that reduces consumption by 8 percent or more.

Increasing federal income taxes permanently, but after a 10-year delay, impacts the recommended level of consumption of younger households the most. This is to be expected because households close to retirement or retired will finance lots of their remaining lifetime consumption from the current assets, the principal of which is not subject to income taxation. For example, the median consumption rate of the youngest households with present value of consumption between \$750,000 and \$1 million equals  $-1.74$  percent under a temporary tax hike; it equals only  $-0.04$  percent under a tax hike imposed with a 10-year delay. However, old, rich households who depend mostly upon asset incomes would prefer a temporary tax increase to a permanent but delayed one.

### ***Cutting Social Security Benefits***

Tables 17 and 18 consider, respectively, 30 percent permanent cuts in Social Security benefits starting either immediately or in ten years. As one would expect, the immediate cuts have major effects on the current consumption of the elderly, particularly the poor elderly. Indeed, the poorest elderly reduce their current consumption by almost a fifth. For the richest elderly, the benefit cut is negligible in terms of the consumption change it engenders. Another noteworthy aspect of these tables is the consumption response of those aged 45-54 who are

middle income. They respond significantly even though their actual receipt of benefits is fairly far off in time.

Table 18 shows a very significant current consumption response to long-range benefit cuts. Those moderately well off and aged 55-64 reduce their current consumption by more than 8 percent, which is very similar to their response if benefits are cut immediately since most of these households must wait for several years before receiving annual benefits. The possibility that the response of current consumption to future benefit cuts could be sizable seems poorly appreciated by policymakers and has little impact on discussions of Social Security and Medicare reform options.

### *How Should Americans Save?*

With the Social Security system under financial pressure, the government has been trying for years to encourage additional saving through retirement accounts. The most recent example of this policy is EGTRRA -- the Economic Growth and Tax Relief Reconciliation Act of 2001, which greatly expanded the limits on contributions to tax-deductible accounts, including 401(k), 403b, Keogh, and traditional IRA plans. It also raised contribution limits of non tax-deductible Roth IRAs. And, in a less well-known provision, it provided a significant non-refundable tax credit to low-income workers for qualified contributions up to \$2,000.

The debate on these provisions proceeded with little discussion of the gains to potential winners. And they proceeded with no discussion of the losses to potential losers, since the general presumption was that participating in tax-favored saving vehicles could only benefit workers by reducing their lifetime taxes. As demonstrated in (Gokhale and Kotlikoff, 2003), this

view is true for high-income workers, but not necessarily the case for low- and moderate-income workers who participate fully in 401(k) and similar tax-deferred saving plans.

How can workers end up with higher lifetime taxes and lower lifetime consumption by saving in a tax-deferred plan? The answer is by raising their taxes in old age by more than they lower them when young, where taxes when young and when old are measured in present value. This can happen for four reasons. First, relatively large withdrawals from 401(k) and other tax-deferred accounts can place one in higher, indeed much higher, tax brackets in retirement than during one's working years. Second, the government can raise taxes when one retires. Third, significant contributions to tax-deferred retirement accounts can place one in lower tax brackets when young. This, in turn, will reduce the value of mortgage interest and other deductions. Fourth, and very importantly, shifting taxable income from youth to old age can substantially increase the share of Social Security benefits that become subject to federal income taxation.

A quite different reason that participating in retirement account saving can reduce lifetime consumption relates to the issue of borrowing constraints and the potential for leaving unintended bequests. If contributing to retirement accounts raises future consumption relative to current consumption because one can't borrow against one's retirement account assets, more consumption will occur in those states of nature in which both spouses are deceased. In calculating lifetime consumption we form the actuarial present value of consumption only in those states in which at least one spouse is alive. Hence, lifetime consumption can decline due to retirement account saving simply because it, in effect, allocates more consumption to those states of the world in which neither spouse is alive to consume.

Tables 22 and 23 record the number of households that experience increases in marginal income tax rates when the husband and wife begin withdrawing their retirement account assets.

Table 19 shows the number of households where the households' marginal tax-rate bracket increases when the husband begins withdrawing from tax-favored saving plans. The numbers in this table can be compared to those in Table 2 that shows the total number of households in each age-present value of consumption cell. Overall, of the 964 observations in the entire sample, 237 (25 percent) of households shift to a higher federal marginal rate bracket when the husband commences retirement plan withdrawals. Table 20 shows the same information, but this time it's the wife who begins withdrawals from her tax-favored saving plans. Here, 98 out of 964 households move into higher federal marginal tax-rate brackets. Finally, Table 21 combines the information from tables 19 and 20. It shows the number of households that shift to a higher federal marginal tax-rate bracket at the commencement of tax-favored plan withdrawals by at least one of the spouses. In particular, the table shows that 278 households out of 964 (that is, 29 percent) of households will be subject to federal income taxes at a higher marginal rate as a result of continuing tax-favored contributions at their current rates.

Table 22 records the number of households for whom Social Security benefits subject to federal income taxation would be reduced were their contributions to tax-deferred retirement accounts eliminated. Overall, 281 out of 964 (29 percent) of households would experience a reduction—implying that their participation in tax-favored saving plans at current rates results in higher taxation of their future Social Security benefits—reducing the tax-advantage of participation in such plans.

Table 23 tabulates the number of our 964 sample households who experience higher lifetime taxes and lower lifetime consumption as a result of participating in tax-deferred saving plans. The total of these households is 70—which is a little more than 10 percent. This is not a huge number, but neither is it trivial. Table 24 shows the median percentage reductions in

consumption experienced by these households for all cells with three or more observations. The reductions range from 0.19 percent to 0.93 percent. Across all 70 observations, the largest reduction is 5.67 percent.

Table 25 shows the median percentage change in lifetime taxes from contributing to retirement accounts. Take the 12 households age 35-44 with lifetime consumption ranging from \$750,000 to \$1 million for whom participation in tax-favored plans at current rates could be hazardous (see table 23). For these households, median lifetime taxes rise by 1.64 percent and median lifetime consumption falls by 0.91 percent thanks to tax-deferred retirement account saving. The fact that the percentage change in lifetime taxes is close, in absolute value, to the percentage change in lifetime consumption despite the fact that lifetime taxes are considerably smaller than lifetime consumption reflects the point made earlier about retirement account saving leading to greater unintended bequests.

Tables 26 and 27 repeat tables 24 and 25 under the assumption that income taxes are increased by 30 percent starting in 10 years. Now, households aged 35-44 with lifetime consumption between 750,000 to \$1 million experience a median decline of 1.02 percent in their lifetime consumption and their lifetime tax payments are 2.72 percent larger.

While participating in tax-deferred saving can be a tax trap for a minority of households, it can be an important tax shelter for others. Tables 28 through 30 provide counts and median percentage changes in lifetime consumption for those households that experience *increases* in lifetime consumption from tax-deferred saving. The number of households experiencing lifetime gains from participating in tax-favored saving plans is much larger—777 out of the entire sample of 964 households, or 81 percent. Increases in lifetime consumption from participating are small for older households for whom only a few years of contributions remain before they retire and

begin plan withdrawals. Younger high earning households, however, stand to benefit substantially by participating. The maximum percentage increase in consumption across the entire sample—12 percent—occurs for a 35-44 year old household with lifetime consumption in the \$4 million or higher range. Median increases in consumption for young, high-earner households, given their current contribution rates continue through retirement, range as high as 3.6 percent (see table 29). Table 30 shows that the corresponding reductions in lifetime tax burdens for such households would exceed 10 percent. In general, tables 29 and 30 show that gains from participation increase by earning level for young households. Gains from continued participation decline with age because older individuals have fewer remaining years of contributions.

Table 31 eliminates contributions to tax favored retirement plans, but grosses up pre-tax wages by the employer matching contribution. It also implements a 30 percent federal income tax hike after 10 years. The median change in the present value of consumption is shown in table 31 for the entire sample. Because most households stand to gain by participating in tax-favored saving plans, eliminating their contributions implies lower lifetime consumption in general. In addition, a 30 percent hike in federal income taxes implemented with a 10 year delay would also lower lifetime consumption. Table 31 shows that younger and high-earning households have the most to lose if they did not have access to tax-favored saving plans and faced a federal tax hike after 10 years. However, the consumption losses of low-earners, both young and old, are small.

Table 32 shows that about two-thirds of the sample of households would experience a reduction in their lifetime consumption were both employer and employee contributions shifted from traditional 401(k) plans to Roth-type plans. This is not surprising given that most

households can expect to be in lower, rather than in higher tax brackets in retirement. Another factor militating against Roths involves the timing of consumption. Because initial contributions are made out of post-tax earnings, shifting to Roth plans increases households' current tax liabilities when working. But for the large fraction of households that are borrowing constrained, paying more in current taxes means less consumption when young and more consumption when old. This shifting of consumption toward the future manner raises, in turn, the possibility that both spouses may die prior to experiencing it. Because we do not consider the potential consumption by children under this contingency when calculating the present value of the household's consumption, the calculated value of the change in consumption from shifting contributions to Roth plans could be negative.

Table 33 shows that the decline is generally larger for younger and poorer households that tend to be borrowing constrained. However, some households, especially those that aren't borrowing constrained, experience a positive change in their lifetime consumption from shifting to Roth IRAs. As indicated by Tables 34 and 35, it is mostly younger and high-earning households that gain on a lifetime basis from such a shift, although the percentage gains are small.

## **VI. Conclusion**

Our results, based on households sampled in the 1995 Survey of Consumer Finances, indicate that a majority of American households is borrowing constrained. Borrowing constraints are ubiquitous among young households. They are also quite common among middle-aged households with low levels of lifetime earnings. The generally higher prevalence of borrowing constraints among low earners reflects the fact that, relative to their pre-retirement

earnings, low earners receive significant Social Security benefits, but cannot borrow against those benefits. While contributions to 401(k), IRAs, and other retirement accounts are a contributing factor to liquidity constraints, most young households would be constrained even in the absence of such contributions. On the other hand, contributing to retirement accounts exacerbates borrowing constraints and entails major sacrifices in current consumption.

We also find very significant heterogeneity in recommended consumption and saving rates as well as in recommended consumption responses to policy changes. The recommended response of a given household is highly sensitive to the household's age and resource levels as well as the particular policy undertaken. The variation in recommended saving rates, even controlling for age and lifetime consumption level, is quite dramatic. This suggests that it may be best to explore responses to policy changes in terms of percentage changes in recommended current consumption levels, rather than in terms of recommended changes in current saving rates.

Median recommended consumption rates, defined as the ratio of current recommended consumption to the present value of lifetime consumption, reveal some expected patterns. They rise with age from about 3 percent for those aged 25-34 to almost 6 percent for young retirees. And they are much smaller for households who are borrowing constrained.

The results from our policy experiments indicate that households should cut their current consumption by as much as 10 percent in response to a permanent 30 percent federal income tax hike. If the tax hike is temporary, the consumption response should be much smaller, particularly for unconstrained, high-earner households. If the tax hike is delayed for 10 years, younger households should reduce their consumption much more substantially than older ones because those in or close to retirement escape most of the hike. However, older households

should still cut their current consumption by as much as 5 percent in anticipation of the future tax increase.

The results from our Social Security policy experiments show that an immediate and permanent 30 percent cut in Social Security benefits would have a major effect on the current consumption of the elderly—lowering it by as much as a fifth in the case of the poor elderly. The wealthier elderly, in contrast, would not need to adjust their consumption by very much.

Our results also show that about 29 percent of U.S. households experience an increase in marginal tax rates during retirement as a result of participating in tax-deferred retirement account saving programs. And a total of 29 percent of households can expect higher taxation of their future Social Security benefits if they continue to contribute to their tax-deferred retirement accounts. Overall, it appears that deferred retirement account saving is raising the lifetime taxes and lowering the lifetime consumption of about 10 percent of households. For some households, the increase in lifetime taxes is as large as 2 percent and the reduction in lifetime consumption as large as 1 percent. These increases in lifetime taxes and reduction in lifetime consumption will of course, be even greater were income tax rates to be raised in the future. Given current tax rates, however, participating in tax-deferred retirement saving plans produces lifetime gains—measured in terms of lower lifetime taxes and higher lifetime consumption – for the majority of U.S. households. Finally, shifting prospective employee and employer contributions from traditional 401(k) and IRA plans into Roth-type plans would, according to our findings, benefit roughly 30 percent of U.S. households. The reason is that paying taxes when young limits bracket creep and the taxation of Social Security benefits when old.

Beyond its specific findings, this paper shows that micro-based life-cycle financial planning models that incorporate borrowing constraints can assist economists and policymakers

in considering how much and in what form households should save/consume and how their saving and consumption behavior may change in response to particular policy changes.

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**Table 1**

**Alternative Means of Eliminating the Federal Government's Present Value Fiscal Gap**

| <b>Policy</b>                    | <b>Immediate and Permanent Percentage Change</b> |
|----------------------------------|--|
| Increase Federal Income Taxes    | 78   |
| Increase Payroll Taxes           | 108  |
| Cut Federal Purchases            | 114  |
| Cut Social Security and Medicare | 51   |

Source: Jagadeesh Gokhale and Kent Smetters, "Fiscal and Generational Imbalances: New Budget Measures For New Budget Priorities," Washington, D.C.: The American Enterprise Institute, 2003 updated for post-2003 changes in policy.

Table 2  
Number of Observations

| AGE   | <i>Present Value of Lifetime Consumption</i> |           |           |            |             |             |        | Total |
|-------|--|-----------|-----------|------------|-------------|-------------|--------|-------|
|       | 0-250k                                       | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |       |
| 25-34 | 0  | 7         | 25        | 27         | 144         | 24          | 3      | 230   |
| 35-44 | 2  | 18        | 39        | 47         | 133         | 24          | 11     | 274   |
| 45-54 | 2  | 15        | 38        | 37         | 94          | 42          | 21     | 249   |
| 55-64 | 2  | 23        | 21        | 17         | 50          | 14          | 14     | 141   |
| 65-74 | 4  | 13        | 17        | 1          | 15          | 9           | 11     | 70    |
| Total | 10   | 76        | 140       | 129        | 436         | 113         | 60     | 964   |

Table 3  
Number of Borrowing-Constrained Observations

| AGE   | <i>Present Value of Lifetime Consumption</i> |           |           |            |             |             |        | Total |
|-------|--|-----------|-----------|------------|-------------|-------------|--------|-------|
|       | 0-250k                                       | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |       |
| 25-34 | 0  | 7         | 23        | 25         | 120         | 19          | 1      | 195   |
| 35-44 | 2  | 16        | 33        | 41         | 83          | 11          | 0      | 186   |
| 45-54 | 2  | 13        | 30        | 24         | 50          | 13          | 1      | 133   |
| 55-64 | 2  | 13        | 11        | 4          | 8           | 1           | 0      | 39    |
| 65-74 | 1  | 6         | 2         | 0          | 1           | 0           | 0      | 10    |
| Total | 7  | 55        | 99        | 94         | 262         | 44          | 2      | 563   |

Table 4  
Number of Borrowing-Constrained Observations in the Absence of Retirement Account Contributions

| AGE   | <i>Present Value of Lifetime Consumption</i> |           |           |            |             |             |        | Total |
|-------|--|-----------|-----------|------------|-------------|-------------|--------|-------|
|       | 0-250k                                       | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |       |
| 25-34 | 0  | 4         | 19        | 21         | 93          | 11          | 0      | 148   |
| 35-44 | 1  | 7         | 19        | 24         | 28          | 3           | 0      | 82    |
| 45-54 | 1  | 9         | 17        | 11         | 23          | 4           | 0      | 65    |
| 55-64 | 2  | 10        | 9         | 2          | 6           | 1           | 0      | 30    |
| 65-74 | 1  | 6         | 2         | 0          | 1           | 0           | 0      | 10    |
| Total | 5  | 36        | 66        | 58         | 151         | 19          | 0      | 335   |

Table 5  
Minimum Consumption Rate  
(percent)

| AGE   | Current Consumption / Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k  | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----  | 2.03      | 1.99      | 1.84       | 1.86        | 2.54        | 3.28   |
| 35-44 | ----  | 2.92      | 2.55      | 1.90       | 2.97        | 3.54        | 3.65   |
| 45-54 | ----  | 2.06      | 2.71      | 3.16       | 2.37        | 0.69        | 3.96   |
| 55-64 | ----  | 2.91      | 3.48      | 4.25       | 2.59        | 4.11        | 4.36   |
| 65-74 | 5.29  | 3.60      | 5.11      | ----       | 5.04        | 4.95        | 4.88   |

Table 6  
Median Consumption Rate  
(percent)

| AGE   | Current Consumption / Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k  | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----  | 3.23      | 3.02      | 3.17       | 3.29        | 3.30        | 3.63   |
| 35-44 | ----  | 3.80      | 3.85      | 3.98       | 4.08        | 4.15        | 4.38   |
| 45-54 | ----  | 3.94      | 4.17      | 4.16       | 4.22        | 4.39        | 4.27   |
| 55-64 | ----  | 4.85      | 4.95      | 4.71       | 4.81        | 4.64        | 4.74   |
| 65-74 | 5.89  | 5.69      | 5.76      | ----       | 5.51        | 5.91        | 5.85   |

Table 7  
Maximum Consumption Rate  
(percent)

| AGE   | Current Consumption / Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k  | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----  | 3.86      | 4.15      | 3.87       | 4.23        | 4.27        | 4.22   |
| 35-44 | ----  | 4.63      | 5.21      | 4.69       | 5.52        | 5.13        | 4.70   |
| 45-54 | ----  | 4.78      | 5.16      | 5.05       | 5.30        | 5.41        | 5.84   |
| 55-64 | ----  | 6.49      | 5.63      | 5.45       | 5.80        | 5.25        | 5.04   |
| 65-74 | 6.85  | 6.88      | 7.19      | ----       | 6.19        | 6.57        | 6.57   |

Table 8  
 Percentage Point Different Between Maximum and Minimum Current Consumption Rate  
 (percent)

| AGE   | Current Consumption / Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k  | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----  | 1.84      | 2.16      | 2.03       | 2.36        | 1.73        | 0.93   |
| 35-44 | ----  | 1.71      | 2.66      | 2.79       | 2.56        | 1.59        | 1.05   |
| 45-54 | ----  | 2.71      | 2.45      | 1.90       | 2.94        | 4.71        | 1.88   |
| 55-64 | ----  | 3.58      | 2.15      | 1.19       | 3.20        | 1.14        | 0.68   |
| 65-74 | 1.55  | 3.28      | 2.07      | ----       | 1.14        | 1.62        | 1.70   |

Table 9  
 Median Consumption Rate - No Borrowing Constraints  
 (percent)

| AGE   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | 3.74      | 3.88      | 3.94       | 3.87        | 3.67        | 3.63   |
| 35-44 | ----                                  | 4.39      | 4.28      | 4.60       | 4.30        | 4.29        | 4.38   |
| 45-54 | ----                                  | 4.33      | 4.45      | 4.42       | 4.41        | 4.55        | 4.31   |
| 55-64 | ----                                  | 4.96      | 5.14      | 4.99       | 4.84        | 4.64        | 4.74   |
| 65-74 | 6.18                                  | 5.81      | 5.79      | ----       | 5.54        | 5.91        | 5.85   |

Table 10  
 Median Percentage Change in Current Consumption from Eliminating Tax-Deferred Saving  
 (percent)

| AGE   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | 16.29     | 12.39     | 9.64       | 6.66        | 6.49        | -0.48  |
| 35-44 | ----                                  | 7.67      | 8.32      | 6.83       | -0.22       | -1.30       | -3.37  |
| 45-54 | ----                                  | 9.67      | 5.21      | -0.29      | -0.74       | -1.70       | -1.25  |
| 55-64 | ----                                  | 2.65      | 2.04      | -0.27      | -0.19       | -0.40       | -0.03  |
| 65-74 | 0.00                                  | 0.00      | 0.00      | ----       | 0.00        | 0.00        | 0.00   |

Table 11  
Minimum Saving Rate  
(percent)

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+  |
|-------|--------|-----------|-----------|------------|-------------|-------------|---------|
| 25-34 | ----   | 21.32     | -10.83    | -16.87     | -66.94      | -45.72      | -31.09  |
| 35-44 | 10.2   | -332.66   | -42.50    | -39.60     | -41.27      | -29.45      | -617.66 |
| 45-54 | 9.1    | -136.67   | -109.62   | -13.53     | -177.72     | -49.30      | -237.86 |
| 55-64 | 21.4   | -82.76    | -64.71    | -69.01     | -129.86     | -62.90      | -906.18 |
| 65-74 | 13.71  | -16.13    | -45.53    | ----       | -192.25     | -340.56     | -968.49 |

Table 12  
Median Saving Rate  
(Percent)

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+  |
|-------|--------|-----------|-----------|------------|-------------|-------------|---------|
| 25-34 | ----   | 37.61     | 24.73     | 7.24       | 5.71        | 3.59        | -9.34   |
| 35-44 | ----   | 29.99     | 18.16     | 13.25      | 9.70        | 7.93        | 9.93    |
| 45-54 | ----   | 31.98     | 19.15     | 24.20      | 19.88       | 9.27        | 11.47   |
| 55-64 | ----   | 18.87     | 17.24     | 17.54      | 5.55        | -5.05       | -46.39  |
| 65-74 | 25.68  | 11.52     | 4.65      | ----       | -20.28      | -105.66     | -266.12 |

Table 13  
Maximum Saving Rate  
(percent)

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | 63.27     | 44.63     | 49.02      | 36.87       | 19.47       | -0.38  |
| 35-44 | 46.9   | 59.68     | 42.76     | 54.64      | 53.54       | 33.66       | 25.53  |
| 45-54 | 41.3   | 50.52     | 58.67     | 47.32      | 48.55       | 35.64       | 56.59  |
| 55-64 | 40.2   | 65.72     | 40.50     | 39.69      | 53.31       | 31.56       | 323.78 |
| 65-74 | 49.62  | 37.05     | 51.70     | ----       | 12.21       | 7.47        | -12.64 |

Table 14  
Median Percentage Change in Current Consumption from Increasing Income Taxes by 30 Percent  
(percent)

| AGE   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | -1.32     | -1.35     | -2.34      | -4.18       | -7.44       | -11.13 |
| 35-44 | ----                                  | -0.22     | -1.87     | -2.82      | -4.72       | -7.56       | -12.66 |
| 45-54 | ----                                  | -0.62     | -2.15     | -3.65      | -4.42       | -7.03       | -10.16 |
| 55-64 | ----                                  | -0.76     | -1.43     | -2.38      | -3.92       | -5.97       | -9.41  |
| 65-74 | 0.00                                  | -0.19     | -0.56     | ----       | -3.23       | -5.02       | -8.73  |

Table 15  
Median Percentage Change in Current Consumption from Increasing Taxes by 30 Percent for 5 Years  
(percent)

| Age   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | -0.26     | -0.45     | -1.74      | -2.68       | -5.09       | -2.32  |
| 35-44 | ----                                  | 0.00      | -0.50     | -1.10      | -1.18       | -1.34       | -2.74  |
| 45-54 | ----                                  | -0.23     | -0.88     | -1.33      | -1.28       | -1.53       | -2.63  |
| 55-64 | ----                                  | -0.58     | -0.68     | -1.01      | -0.96       | -1.42       | -2.21  |
| 65-74 | 0.00                                  | -0.01     | -0.21     | ----       | -0.81       | -1.63       | -2.90  |

Table 16  
Median Percentage Change in Current Consumption from Increasing Taxes by 30 Percent Starting After 10 Years  
(percent)

| Age   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | -0.18     | -0.01     | 0.04       | -0.12       | -4.05       | -4.13  |
| 35-44 | ----                                  | 0.01      | 0.02      | 0.00       | -1.21       | -2.50       | -9.60  |
| 45-54 | ----                                  | 0.00      | 0.00      | 0.00       | -0.93       | -1.83       | -2.10  |
| 55-64 | ----                                  | 0.00      | -0.11     | -1.40      | -0.32       | -4.04       | -4.62  |
| 65-74 | 0.00                                  | 0.00      | -0.01     | ----       | -0.24       | -4.18       | -5.19  |

Table 17  
 Median Percentage Change in Current Consumption from Cutting Social Security Benefits by 30 Percent  
 (percent)

| Age   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | -0.77     | 0.06      | 0.08       | 0.04        | 0.01        | -1.18  |
| 35-44 | ----                                  | -0.26     | -0.05     | -0.01      | -3.48       | -3.20       | -1.90  |
| 45-54 | ----                                  | -0.06     | -1.31     | -4.96      | -4.96       | -3.40       | -1.12  |
| 55-64 | ----                                  | -10.17    | -9.07     | -9.35      | -5.98       | -3.76       | -1.19  |
| 65-74 | -17.72                                | -14.66    | -11.46    | ----       | -6.45       | -3.32       | -0.45  |

Table 18  
 Median Percentage Change in Current Consumption from Cutting Social Security Benefits by 30% Starting in 10 Years  
 (percent)

| Age   | Present Value of Lifetime Consumption |           |           |            |             |             |        |
|-------|---------------------------------------|-----------|-----------|------------|-------------|-------------|--------|
|       | 0-250k                                | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
| 25-34 | ----                                  | -0.77     | 0.11      | 0.09       | 0.06        | 0.02        | -1.18  |
| 35-44 | ----                                  | -0.19     | 0.00      | 0.05       | -3.48       | -3.20       | -1.89  |
| 45-54 | ----                                  | -0.05     | -1.31     | -4.96      | -4.87       | -3.40       | -1.12  |
| 55-64 | ----                                  | -5.22     | -6.01     | -8.60      | -5.21       | -3.41       | -1.03  |
| 65-74 | -5.16                                 | -7.71     | -6.25     | ----       | -4.12       | -2.08       | -0.37  |

Table 19  
 Number of Observations for Which Husband's Marginal Tax Rate Rises  
 When He Begins Withdrawing from his Retirement Accounts

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 5         | 6         | 4          | 43          | 10          | 1      | 69    |
| 35-44 | 1      | 4         | 2         | 5          | 50          | 17          | 2      | 81    |
| 45-54 | 0      | 7         | 4         | 6          | 29          | 23          | 7      | 76    |
| 55-64 | 0      | 0         | 0         | 2          | 6           | 3           | 0      | 13    |
| 65-74 | 0      | 0         | 0         | 0          | 0           | 0           | 0      | 0     |
| Total | 1      | 16        | 12        | 17         | 128         | 53          | 10     | 237   |

Table 20  
 Number of Observations for Which Wife's Marginal Tax Rate Rises  
 When She Begins Withdrawing from her Retirement Accounts

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 1         | 1         | 0          | 19          | 3           | 0      | 24    |
| 35-44 | 0      | 0         | 4         | 3          | 20          | 8           | 0      | 35    |
| 45-54 | 0      | 1         | 3         | 2          | 12          | 9           | 2      | 29    |
| 55-64 | 0      | 0         | 0         | 1          | 4           | 3           | 1      | 9     |
| 65-74 | 0      | 0         | 0         | 0          | 1           | 0           | 0      | 1     |
| Total | 0      | 2         | 8         | 6          | 56          | 23          | 3      | 98    |

Table 21  
Number of Observations for Which At Least One Spouse's Marginal Tax Rate Rises  
When She Begins Withdrawing from her Retirement Accounts

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 5         | 7         | 4          | 48          | 11          | 1      | 76    |
| 35-44 | 1      | 4         | 6         | 7          | 57          | 17          | 2      | 94    |
| 45-54 | 0      | 7         | 5         | 7          | 36          | 26          | 7      | 88    |
| 55-64 | 0      | 0         | 0         | 3          | 9           | 5           | 1      | 18    |
| 65-74 | 0      | 0         | 0         | 0          | 1           | 0           | 0      | 1     |
| Total | 1      | 16        | 18        | 21         | 151         | 59          | 11     | 278   |

Table 22  
Number of Observations for Which Household's Taxation of Social Security  
Benefits Rises Due to Saving in Retirement Accounts

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 6         | 17        | 9          | 36          | 0           | 0      | 68    |
| 35-44 | 0      | 3         | 20        | 27         | 62          | 1           | 0      | 113   |
| 45-54 | 0      | 2         | 16        | 22         | 31          | 0           | 1      | 72    |
| 55-64 | 0      | 0         | 6         | 9          | 9           | 0           | 0      | 24    |
| 65-74 | 0      | 0         | 0         | 0          | 4           | 0           | 0      | 4     |
| Total | 0      | 11        | 59        | 67         | 142         | 1           | 1      | 281   |

Table 23  
Number of Observations in which Lifetime Consumption is Reduced and Lifetime Taxes are  
Increased from Contributing to Retirement Accounts

| Age   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 0         | 1         | 0          | 4           | 0           | 0      | 5     |
| 35-44 | 2      | 2         | 2         | 12         | 6           | 0           | 0      | 24    |
| 45-54 | 1      | 2         | 6         | 5          | 11          | 4           | 0      | 29    |

|       |   |   |    |    |    |   |   |    |
|-------|---|---|----|----|----|---|---|----|
| 55-64 | 0 | 1 | 2  | 1  | 4  | 0 | 0 | 8  |
| 65-74 | 0 | 3 | 0  | 0  | 1  | 0 | 0 | 4  |
| TOTAL | 3 | 8 | 11 | 18 | 26 | 4 | 0 | 70 |

Table 24  
Median Percentage Change in Lifetime Consumption from Saving in Tax-Deferred Retirement Accounts  
for those Experiencing Reductions in Lifetime Consumption

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | ----      | ----      | ----       | -0.68       | ----        | ----   |
| 35-44 | ----   | ----      | ----      | -0.91      | -0.39       | ----        | ----   |
| 45-54 | ----   | ----      | -0.93     | -0.86      | -0.44       | -0.57       | ----   |
| 55-64 | ----   | ----      | ----      | ----       | -0.29       | ----        | ----   |
| 65-74 | ----   | -0.19     | ----      | ----       | ----        | ----        | ----   |

Table 25  
Median Percentage Change in Lifetime Taxes from Saving in Tax-Deferred Retirement Accounts  
for those Experiencing Reductions in Lifetime Consumption

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | ----      | ----      | ----       | 0.94        | ----        | ----   |
| 35-44 | ----   | ----      | ----      | 1.64       | 0.38        | ----        | ----   |
| 45-54 | ----   | ----      | 1.77      | 1.75       | 1.17        | 0.70        | ----   |
| 55-64 | ----   | ----      | ----      | ----       | 1.13        | ----        | ----   |
| 65-74 | ----   | 1.91      | ----      | ----       | ----        | ----        | ----   |

Table 26  
Median Percentage Change in Lifetime Consumption from Saving in Tax-Deferred Retirement Accounts  
for those Experiencing Reductions in Lifetime Consumption--Federal Tax Hike of 30 Percent After 10 Years

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | ----      | ----      | ----       | -0.48       | ----        | ----   |
| 35-44 | ----   | ----      | ----      | -1.02      | -0.61       | ----        | ----   |
| 45-54 | ----   | ----      | -0.82     | -1.16      | -0.59       | -0.53       | ----   |
| 55-64 | ----   | ----      | ----      | ----       | -0.44       | ----        | ----   |
| 65-74 | ----   | -0.22     | ----      | ----       | ----        | ----        | ----   |

Table 27  
Median Percentage Change in Lifetime Taxes from Saving in Tax-Deferred Retirement Accounts  
for those Experiencing Reductions in Lifetime Consumption--Federal Tax Hike of 30 Percent After 10 Years

|  | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|--|--------|-----------|-----------|------------|-------------|-------------|--------|
|--|--------|-----------|-----------|------------|-------------|-------------|--------|

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| 25-34 | ---- | ---- | ---- | ---- | 0.57 | ---- | ---- |
| 35-44 | ---- | ---- | ---- | 2.72 | 1.15 | ---- | ---- |
| 45-54 | ---- | ---- | 4.29 | 3.79 | 1.35 | 0.65 | ---- |
| 55-64 | ---- | ---- | ---- | ---- | 1.65 | ---- | ---- |
| 65-74 | ---- | 1.91 | ---- | ---- | ---- | ---- | ---- |

Table 28  
Number of Observations in which Lifetime Consumption is Increased and Lifetime Taxes are Reduced from Contributing to Retirement Accounts

| Age   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 3         | 24        | 26         | 133         | 24          | 3      | 213   |
| 35-44 | 0      | 15        | 32        | 31         | 120         | 21          | 11     | 230   |
| 45-54 | 1      | 11        | 26        | 28         | 75          | 38          | 21     | 200   |
| 55-64 | 0      | 16        | 16        | 13         | 42          | 13          | 12     | 112   |
| 65-74 | 1      | 4         | 4         | 0          | 10          | 3           | 0      | 22    |
| Total | 2      | 49        | 102       | 98         | 380         | 99          | 47     | 777   |

Table 29  
Median Percentage Change in Lifetime Consumption from Saving in Tax-Deferred Retirement Accounts for those Experiencing Increases in Lifetime Consumption

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | 0.71      | 1.25      | 1.32       | 2.19        | 3.57        | 0.92   |
| 35-44 | ----   | 1.64      | 1.09      | 1.49       | 2.16        | 2.60        | 3.16   |
| 45-54 | ----   | 1.22      | 1.39      | 1.53       | 1.78        | 2.25        | 1.77   |
| 55-64 | ----   | 0.59      | 0.33      | 0.79       | 0.35        | 0.40        | 0.04   |
| 65-74 | ----   | 0.02      | 0.01      | ----       | 0.01        | 0.01        | 0.00   |

Table 30  
Median Percentage Change in Lifetime Taxes from Saving in Tax-Deferred Retirement Accounts for those Experiencing Increases in Lifetime Consumption

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | ----   | 2.79      | 3.26      | 4.56       | 7.69        | 10.00       | 5.70   |
| 35-44 | ----   | 3.35      | 4.02      | 5.41       | 7.30        | 10.14       | 12.12  |
| 45-54 | ----   | 3.58      | 3.36      | 6.74       | 5.66        | 9.00        | 11.07  |
| 55-64 | ----   | 1.66      | 2.69      | 3.02       | 3.15        | 2.59        | 1.43   |
| 65-74 | ----   | 0.22      | 0.07      | ----       | 1.14        | 0.07        | 0.00   |

Table 31  
 Median Change in the Present Value of Consumption  
 After Eliminating Tax-Deferred Contributions and Implementing a 30% Increase in Federal Income Taxes After 10 Years  
 (percent)

|       | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | 0.00   | -1.32     | -2.50     | -3.83      | -6.64       | -10.48      | -6.76  |
| 35-44 | 0.00   | -1.95     | -2.31     | -2.47      | -5.08       | -7.99       | -11.98 |
| 45-54 | 0.00   | -0.95     | -1.57     | -2.18      | -3.62       | -6.60       | -7.76  |
| 55-64 | 0.00   | -0.50     | -0.50     | -1.45      | -3.04       | -4.02       | -4.75  |
| 65-74 | 0.00   | -0.06     | -0.17     | 0.00       | -2.04       | -2.53       | -3.46  |

Table 32  
 Number of Observations in which Lifetime Consumption is Reduced by  
 Shifting Future Contributions from Regular to Roth IRA's

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
| 25-34 | 0      | 7         | 25        | 27         | 99          | 19          | 0      | 177   |
| 35-44 | 0      | 17        | 37        | 36         | 99          | 14          | 2      | 205   |
| 45-54 | 2      | 12        | 37        | 26         | 63          | 24          | 14     | 178   |
| 55-64 | 2      | 22        | 16        | 10         | 21          | 6           | 6      | 83    |
| 65-74 | 1      | 4         | 2         | 1          | 5           | 1           | 0      | 14    |
| Total | 5      | 62        | 117       | 100        | 287         | 64          | 22     | 657   |

Table 33  
 Median Percentage Change in Present Value of Lifetime Consumption For Those Whose Consumption  
 Is Reduced By Shifting Future Contributions from Regular to Roth IRAs

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | 0.00   | -1.77     | -0.90     | -0.69      | -1.19       | -1.60       | 0.00   |
| 35-44 | 0.00   | -1.86     | -1.30     | -0.96      | -1.44       | -1.78       | 0.00   |
| 45-54 | 0.00   | -1.24     | -1.20     | -2.27      | -0.80       | -1.38       | -0.34  |
| 55-64 | 0.00   | -0.65     | -0.68     | -0.85      | -0.20       | -0.49       | -0.09  |
| 65-74 | 0.00   | -0.15     | 0.00      | 0.00       | -0.01       | 0.00        | 0.00   |

Table 34  
 Number of Observations in which Lifetime Consumption is Increased by  
 Shifting Future Contributions from Regular to Roth IRA's

| AGE | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ | Total |
|-----|--------|-----------|-----------|------------|-------------|-------------|--------|-------|
|-----|--------|-----------|-----------|------------|-------------|-------------|--------|-------|

|       |   |    |    |    |     |    |    |     |
|-------|---|----|----|----|-----|----|----|-----|
| 25-34 | 0 | 0  | 1  | 1  | 45  | 6  | 3  | 56  |
| 35-44 | 2 | 3  | 2  | 9  | 36  | 8  | 9  | 69  |
| 45-54 | 0 | 3  | 4  | 10 | 32  | 17 | 7  | 73  |
| 55-64 | 0 | 2  | 4  | 5  | 29  | 8  | 8  | 56  |
| 65-74 | 0 | 2  | 4  | 0  | 7   | 2  | 2  | 17  |
| Total | 2 | 10 | 15 | 25 | 149 | 41 | 29 | 271 |

Table 35

Median Percentage Change in Present Value of Lifetime Consumption For Those Whose Consumption Is Increased By Shifting Future Contributions from Regular to Roth IRAs

| AGE   | 0-250k | 250k-500k | 500k-750k | 750k-1000k | 1000k-2000k | 2000k-4000k | 4000k+ |
|-------|--------|-----------|-----------|------------|-------------|-------------|--------|
| 25-34 | 0.00   | 0.00      | 0.00      | 0.00       | 0.19        | 0.32        | 0.17   |
| 35-44 | 0.00   | 0.05      | 0.00      | 0.11       | 0.18        | 0.54        | 0.74   |
| 45-54 | 0.00   | 0.85      | 0.29      | 0.16       | 0.25        | 0.23        | 0.07   |
| 55-64 | 0.00   | 0.00      | 0.20      | 0.02       | 0.15        | 0.11        | 0.01   |
| 65-74 | 0.00   | 0.00      | 0.00      | 0.00       | 0.00        | 0.00        | 0.00   |