

# **Social Security and Retirement Savings Accounts**

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## Abstract

The role that defined contribution pension plans and, in particular, 401(k) retirement plans play in retirement planning for Americans is of current interest to the U.S Congress, to regulators, to employers and employees, and to academics. The recent turmoil in world financial markets has brought increased attention to the growing use of defined contribution (DC) plans versus traditional defined benefit (DB) pension plans. DC plans shift the risk of investment underperformance onto the employee. Thousands of Americans have received a rude shock upon opening their 401(k) statements in recent months. This provides ammunition to those that question the fairness and effectiveness of DC plans and 401(k)s, including Roth-style 401(k)s, in providing retirement security. In addition to shifting investment risk onto the worker, complaints include the belief that the benefits of 401(k)s are disproportionately available to the wealthy and that 401(k)s do little to help lower income workers prepare for retirement. Overlaid on this 401(k)/DC versus DB debate are the complications the nation faces in meeting the costs of providing Social Security benefits to the retiring “baby boomers.” This paper offers a proposal for increasing the use of tax-deferred savings accounts by tying the accounts into Social Security reform. We extend recent work by Ghilarducci (2007) and form an approach to retirement that generates increased retirement security for workers with approximately twenty or more years left in their working lives. Given that same time horizon, our plan solves the Social Security underfunding crisis. The proposal requires no new taxes and does not reduce revenues currently flowing to the U.S. Treasury.

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The role that defined contribution pension plans and, in particular, 401(k) retirement plans play in retirement planning for Americans is of current interest to the U.S Congress, to regulators, to employers and employees, and to academics. The recent turmoil in world financial markets has brought increased attention to the growing use of defined contribution (DC) plans versus traditional defined benefit (DB) pension plans. DC plans shift the risk of investment underperformance onto the employee. Thousands of Americans have received a rude shock upon opening their 401(k) statements in recent months. This provides ammunition to those that question the fairness and effectiveness of DC plans and 401(k)s, including Roth-style 401(k)s, in providing retirement security. In addition to shifting investment risk onto the worker, complaints include the belief that the benefits of 401(k)s are disproportionately available to the wealthy and that 401(k)s do little to help lower income workers prepare for retirement. Overlaid on this 401(k)/DC versus DB debate are the complications the nation faces in meeting the costs of providing Social Security benefits to the retiring “baby boomers.” This paper offers a proposal for increasing the use of tax-deferred savings accounts by tying the accounts into Social Security reform. We extend recent work by Ghilarducci (2007) and form an approach to retirement that generates increased retirement security for workers with approximately twenty or more years left in their working lives. Given that same time horizon, our plan solves the Social Security underfunding crisis. The proposal requires no new taxes and does not reduce revenues currently flowing to the U.S. Treasury.

## **Introduction**

Defined contribution (DC) plans continue to be preferred over defined benefit (DB) plans, especially by smaller employers. Hewitt Associates surveyed employers offering pension plans and found that ninety-three percent of the respondents offered a DC plan, while only forty-eight percent offer an ongoing DB plan (Hewitt, 2008). One important reason for this disparity is that defined contribution plans shift the risk of underperformance in investments to the employee.

However, concern abounds as to whether or not employees have the ability to successfully manage their retirement portfolios. For example, far too many participants in 401(k)s (approximately 47%) place 100% of their 401(k) money into money market type investments, while approximately 22% allocate 100% to equity (Nofsinger, 2008).

Traditional 401(k)s provide an immediate tax benefit in that employee contributions are excluded from taxable income and employer contributions are tax deductible to the employer. The accounts grow on a tax-deferred basis while withdrawals are taxed as income in the year of withdrawal. Contributions to Roth 401(k)s are made with after-tax dollars, and thus do not diminish immediate tax revenue to the government. Growth in the value of the Roth accounts as well as disbursements that meet established rules are not taxed, thus imposing a reduction in future tax revenue to the government, *ceteris paribus*. Some members of Congress find it difficult to justify this foregone tax revenue (tax expenditure) of 401(k)s and Roth 401(k)s without the social benefit of an increase in the U.S. savings rate and/or widespread participation in 401(k) plans, specifically including lower income workers participating in 401(k)s. Rep. George Miller, D, California, commented in Congressional hearings held in October of 2008 that, “We’ve [i.e., the government] invested \$80 billion into subsidizing this activity [401(k)s] ...[that] are not generating what ... they should.”

However, the social benefits of retirement policies can also be measured from the perspective of the general good, and not merely by looking at the specific benefits that might indeed disproportionately accrue to wealthier workers from 401(k) plans. In particular, we have in mind the general social benefit of reducing the financial burden that payment of Social Security benefits are soon to place on the U.S. government. Within a few years, sometime between 2017 and 2019, the payroll taxes that U.S workers pay in support of Social Security programs will no longer be sufficient to meet the demands placed on the Social Security system by the retirement of the “baby boom” generation born between 1946 and 1964. In about thirty years time, around 2037, the Social Security system will have exhausted the Old Age, Survivors, and Disability trust fund (OASDI) that has been built up in recent years. Many reform proposals have been proposed to address these expectations, ranging from privatization of Social Security to funding

the system from general revenue. President Clinton noted some years ago that there are only three options that matter (Tanner, 2004):

- (i) cut benefits,
- (ii) invest Social Security taxes to earn market rates of return, or
- (iii) raise taxes.

This paper adds a twist to the “cut benefits” option that makes the concept economically and politically feasible. We craft a mechanism that replaces the existing 401(k) accounts with a new program of tax-deferred savings. As does Ghilarducci (2007), we substitute tax credits for participants in our plan for the tax expenditures of 401(k)s. For lower income workers, these tax credits make the effective out-of-pocket cost almost zero. For younger workers of all income levels the benefits of the plan are clear, as we demonstrate in our results (Table 1). Workers in the middle years of their working lives also benefit (Table 2). However, older workers see no improvement or only minor improvement under this proposal (Table 3). The greatest payoff from our proposal is that for a sufficient lead time (approximately twenty years), the plan results in the elimination or near elimination of the pending Social Security funding shortfall.

Given recent market conditions, there is apprehension among many as to the wisdom of investing in security markets (Spitzer, 2009). We disagree with those who counsel abandonment of the markets. Securities markets remain the most attractive investment option for investors with long term horizons such as those for retirement planning. Our plan alleviates the concern that securities markets underperform, at least to some degree, by making the determination of the impact of our plan on Social Security benefits to be after the fact. That is, the magnitude of a participant’s reduction in Social Security benefits is conditional on the investment results the individual actually experiences leading up to retirement. In a nutshell, if one experiences poor investment results, their benefits are reduced only a little or perhaps not at all. If markets experience investment performance more in line with the historical record, Social Security benefits are reduced but the benefits from the savings account outweigh (and far outweigh for younger workers) the reduction in Social Security benefits. Our proposal creates reductions in Social Security benefits ranging from zero percent, if security markets perform poorly, to twenty percent or more if markets perform well. By eliminating the current 401(k) plans and

substituting our plan, the net revenue impact on the Federal government, compared to existing programs, is nil, in a manner similar to that proposed in Ghilarducci's (2007) plan to replace 401(k)s with guaranteed retirement accounts (GRAs). Thus, our proposal dramatically reduces and possibly eliminates the Social Security underfunding problem, significantly enhances the retirement income of U.S. workers, without any net loss in current revenue to the Treasury, without raising taxes, without significant transition costs, and without giving politicians more money to spend.

We proceed by presenting a review of the literature relating to retirement planning and Social Security reform in the next section. We start with the important recent contributions of Teresa Ghilarducci (2007). We next establish the clear trend away from defined benefit plans and towards defined contribution plans. We establish the reality of the looming Social Security crisis. In regards Social Security reform, we contrast the pay-as-you-go (PAYGO) approach to Social Security adopted by the U.S. government with funded approaches to pensions. The discussion identifies within current research which groups favor PAYGO, which groups favor funded approaches, and the impact of the choice on the U.S. national savings rate, employment, and wages. We follow our literature review with a section detailing our proposed plan, followed by a section reporting the results of some simulations of the proposal, and end the paper with a discussion of the plan's impact on the future of Social Security.

## **Literature Review**

Ghilarducci (2007) presents her proposal for the reform of U.S. retirement policies and planning in her Economic Policy Institute Briefing Paper of November 20, 2007. She argues for establishing a system of guaranteed retirement accounts (GRAs), with mandatory participation by all employees except those covered by an adequate defined benefit plan. Five percent of worker compensation would be placed into the accounts, with the cost of the contribution split between employer and employee. Employee contributions would come from after-tax income and employer contributions would not be tax deductible expenses to the employer. The accounts would be administered by the Social Security Administration and the investment funds managed by the Thrift Savings Plan currently available to federal workers. A real, inflation-adjusted

return of 3% would be paid on the accounts. A \$600 tax credit would be provided to each individual participant. The \$600 credit would offset the employee portion of the contribution, up to income levels of \$24,000 ( $\$24,000 \times 0.025 = \$600$ ). At retirement, benefits would be taken in the form of a life annuity. If a participant dies prior to reaching retirement age, half of the participant's account value would be retained by the government and half would be available to the estate of the deceased.

Under her proposal, 401(k)s would no longer have tax advantages. Only defined benefit plans would have contributions that are tax deductible to the employer. Thus, DB plans should witness a resurgence, in Ghilarducci's estimation. This has the desirable effect, in Ghilarducci's eyes, of removing the risk of investment underperformance from the employee, while creating retirement benefits for a broader class of workers than those who currently benefit from 401(k)s.

Ghilarducci is concerned about the growth of defined contribution plans and the shift away from defined benefit plans. A survey conducted by Hewitt Associates (2008) of employers who offer pension plans supports the notion that employers who offer pension plans prefer DC plans to DB plans. 93% of the respondents offered a DC plan, while only 48% had an ongoing DB plan. The Employee Benefit Research Institute (<http://www.ebri.org>) reports U.S. Department of Labor statistics showing an increase in the number of workers covered by DC plans from 18.9 million in 1980 to 52.2 million workers in 2004. During that same period, participants in DB plans declined from 30.1 million to 20.6 million. Given the growing problem of underfunded DB plans and the current economic turmoil, it is not clear that DB plans will grow in the near future even should Ghilarducci's plan be adopted. EBRI also reports the foregone tax revenue (tax expenditure) of employment based plans (DB, DC, and 401(k) plans) as \$95 billion in 2008 with a forecast of \$119 billion per year by 2013.

In comparing the proposal we present in this paper to Ghilarducci's work, our plan is similar to hers in that we both propose that traditional 401(k)s lose their tax advantaged status. As does Ghilarducci, we propose that tax credits roughly equivalent to the "tax expenditure" of 401(k) plans be created to provide incentives for workers to fund retirement accounts. In contrast to Ghilarducci, we rely on private sector fund managers rather than the Social Security

Administration to administer the accounts. Our plan does not require the government to take on the risk of guaranteeing the three percent real return of Ghilarducci's plan. Our plan makes the reduction in Social Security benefits conditional on the investment results of the individual accounts. The social benefit of our proposal is that it reduces the fiscal strain soon to be placed on the federal government by payment of Social Security retirement benefits to the "baby boom" generation and the generations following, making those Social Security benefit payments more secure. We argue that this goal, securing Social Security, is far more attractive to most Americans than is Ghilarducci's emphasis on income redistribution.

The financial viability of the Social Security program in the United States has been called into question for some time. Various estimates have the Social Security trust fund (the combined Old-Age, Survivors, and Disability Insurance (OASDI) fund) no longer being able to pay all of the annual scheduled benefits by 2017. Technically, by 2017 the trust fund ratio, defined as the ratio of the assets in the trust fund at the beginning of the year expressed as a percentage of the cost during the year, would be less than 100%. Former U.S. Comptroller General (head of the General Accounting Office), David Walker places the unfunded obligations for Medicare and Social Security at almost \$41 trillion and warns that, "balancing the budget in 2040 could require us to cut federal spending by 60% or raise overall federal tax burdens to twice today's levels" (Walker, 2008).

We note that many proposals have been made to address the forecasted shortfall and to keep the program solvent. A good overall review of proposals is presented in the U.S. Government Accountability Office (GAO) report (2007) on Social Security reform. That report reviews 17 proposals made to address the trust fund's solvency. As indicated in the report, the trust fund ratio will be less than 100% beginning in 2017. The report distinguishes those proposals that suggest new revenue sources from those that would reallocate revenue from current sources; and also distinguishes those that would maintain the current structure from those that would propose new structures, such as Individual Accounts (IAs), also known as Personal Retirement Accounts (PRAs). Proposals for maintaining the current structure include those that 1) would provide unlimited general revenue transfers as needed to maintain the solvency of the trust fund; 2) would raise or eliminate the earnings cap for the payroll tax; 3) would increase the payroll tax

percentage (currently 12.4%); 4) would tax earnings above the cap at a lower rate; and/or 5) would expand coverage and taxability to those state and local employees not currently covered. Some of the proposals that advocate the creation of IAs also propose some of the other adjustments mentioned above.

Feldstein and Rangelova (2001) and Feldstein and Samwick (2001) argue for the creation of PRAs. Such accounts would be constructed as defined contribution plans – employees would be required to contribute some small percentage of their wages (perhaps 1.5-2.0%) into their own individual accounts. The funds deposited in their accounts would be invested in a portfolio of stocks and bonds – most likely indexes representing a broad mix of equities and fixed income investments (e.g., the S&P 500 SPDRs or the Lehman Aggregate Bond index, respectively). Feldstein and Rangelova argue that for every dollar that must be contributed in a pay-as-you-go system (the current Social Security system), only \$0.165 needs to be contributed in a PRA system, assuming an 8.5% nominal rate of return, to achieve similar benefit results. Their model assumes a 60%-40% allocation between equity (proxied by the S&P 500 index) and debt (proxied by Salomon Brothers' corporate bond index), respectively. Based on 10,000 simulations of historical return data, they show that PRAs based on a 4% savings rate will generate a median annuity that is 141% of the benchmark Social Security benefit. At that level of savings there is, however, better than a 30% chance of realizing a lower benefit than that provided by the current Social Security program.

Tanner (2004) outlines a reform plan that allows workers to invest their portion of the payroll tax into private accounts. Thus, Tanner's plan places significant transition costs on the Social Security system as fifty percent of the current funding is removed from the Social Security system. Feldstein and Samwick (2001) present several different proposals, with the base proposal being one in which individuals transfer an amount of their payroll tax equal to 1.5% of savings into an investment account as long as the individual agrees to match that with a deposit of an equal amount from the worker's income. In their plan, individuals would have full ownership of their PRAs and have the right to bequeath accumulated funds if the individual dies before he or she retires. The plan also requires a transfer of general revenue. Results based on

different real rates of return generated by a 60%-40% portfolio of stocks and bonds, respectively, typically exceed the benefits projected under current law.

Nataraj and Shoven (2003) consider the introduction of PRAs while considering the current Social Security system as a risky program since benefits cannot truly be guaranteed. Thus, they model the introduction of PRAs in combination with the pay-as-you-go Social Security program as a portfolio problem – a two-tier system. For the PRA portion of the system, a 60%-40% allocation in big company stocks and long term corporate bonds, respectively, is made. They find, based on simulation analysis, that the variance minimizing system is, in fact, a two-tier system; and, for utility maximization, a significant PRA contribution is recommended.

The U.S. is not in the lead in considering PRAs. As noted by Schieber and Shoven (1996), Chile, Australia, and Sweden, at the time of their article, have instituted or will institute some system of employer and/or employee based contribution system. Chile's system had been recognized as a leader in this regard, although demographics and financial characteristics of the country helped greatly to underpin their program's success.

Finally, Diamond and Orszag (2005) propose more traditional measures to deal with Social Security's projected fund shortfall. Importantly, they propose a combination of reduced benefits and increased payroll tax. They are opposed to the creation of PRAs, since the creation of such accounts would immediately increase the deficit of the Social Security program (known as the "transition financing" issue). In addition, creation of such accounts would introduce an element of market risk not faced by individuals in the current Social Security program.

### **Outline of the plan**

Workers make after-tax contributions to tax-deferred savings plans. Our proposal is that 6.25% of net compensation be placed into these accounts. In our current proposal, we make these contributions mandatory. In earlier versions of our work, we made these contributions voluntary. By making the contributions mandatory, we can get a clear sense of the dramatic impact the plan

can have on the looming Social Security funding crisis. The potential impact of a voluntary plan is clouded by the uncertainty of level of participation among workers.

The contributions would be invested in a manner similar to that of the Thrift Savings Plan available to current Federal government employees (<http://www.tsp.gov/index.html>). Tax credits offset all or a portion of the cost of these investments, making the program free of out-of-pocket expense for lower income workers. At retirement, the investment account is used to purchase a life annuity (other settlement options might be made part of the plan, but we only incorporate the life annuity settlement in this paper). The amount of this annuity depends on the realized value of the investment accounts at the time of retirement or application for other Social Security benefits. In sharp contrast to Ghilarducci, we do not propose to have the Federal government guarantee the investment performance of these accounts. To do so would negate, potentially, the social benefit of our plan. We want to reduce government obligations not create new government obligations. Social Security benefits are reduced by a fraction of the life annuity. Our plan uses the marginal tax rate of the worker/retiree at the time of retirement as the fraction. For example, if the life annuity at retirement is \$1,000 and the tax rate of the worker/retiree is 28%, the worker's retirement benefit would be reduced by \$280.

Our plan differs from the proposals by Feldstein, Rangelova, and Samwick and those of Tanner cited above in that none of a worker's payroll tax will be diverted into investment accounts. Therefore, transition costs for our plan are minimal. All money deposited into the accounts will be from the after-tax income of the workers. Collections from the payroll tax on workers as well as income tax collections stay as they are under current law. The tax credit is funded by eliminating further contributions to current 401(k) plans. We do note that the tax-deferred growth in the savings plans is likely to exceed the equivalent tax expenditure for ongoing 401(k) plans as it is likely that our proposal will have greater participation than current 401(k)s. Thus, admittedly, tax expenditure on these retirement plans might grow somewhat in future years relative to current forecasts. However, under our proposal, there is no immediate reduction in taxes collected by the Federal government.

To understand the impact our proposal will have on Social Security, a little background on how Social Security benefits are calculated is in order. To determine one's Social Security benefit, Social Security first calculates the averaged indexed monthly earnings (AIME) of a worker. Then the primary insurance amount (PIA) is determined from the AIME, as described below. The PIA is the basic benefit amount to be paid to a retiree. Benefits to spouses, survivors, and dependents are some fraction of PIA. AIME is the average of a worker's highest thirty-five years earnings, where the earnings are indexed for inflation using the CPI. Social Security brings all the worker's yearly earnings, or the cap in earnings for that year should earnings exceed the wage cap (\$102,000 in 2008), to their inflation-indexed value at the year of retirement, then selects the highest thirty-five years of these earnings, and then calculates the average of these thirty-five years of earnings. Dividing this number by 12 yields the AIME.

The AIME is used to calculate the worker's primary insurance amount (PIA). The PIA is the basic Social Security monthly benefit paid to retirees. Calculation of the PIA reflects two "bend points" that allow for higher income replacement for lower-income workers than for higher-income workers. For 2008, the first bend point occurs at \$711 of AIME and the second bend point is at \$4,288. For 2008, PIA is calculated as 90% of AIME at or below \$711 plus 32% of AIME between \$712 and \$4,288 plus 15% of AIME in excess of \$4,288. Thus, for higher-income workers, the marginal income replacement ratio from Social Security is 15%.

Under our proposal, at the time of filing for Social Security benefits, the realized value of the tax-deferred savings is used to buy a life annuity (in the simulations reported in the following section we use a thirty year term annuity to proxy for a life annuity). A variation allowing the worker to take the tax-deferred savings as a lump sum or partially as a lump sum and partially as an annuity could be made a feature of our proposal, but for the remainder of this paper we will assume that the savings are used to purchase a life annuity. Social Security benefits are adjusted annually for inflation. In order to place the life annuities on a similar basis, we build an inflation adjustment into the life annuity. We proxy this by using real, inflation-adjusted rates of return in calculating our annuity simulations. The 2009 report of the Social Security trustees (Board of Trustees, 2009), posits various interest scenarios. The trustees' middle scenario assumes inflation of 2.8%, real rates of return of 2.9%, and, therefore, nominal rates of 5.7%. We

incorporate these interest rate assumptions into our simulation. The PIA determined at the time of filing for Social Security is reduced by a fraction of the life annuity amount. We propose that the marginal tax rate of the beneficiary be used as this fraction. Thus, we do build progressivity into our plan without changing the main focus of our plan from solving the Social Security crisis.

We assume that our new retirement accounts replace, in effect, the current 401(k) retirement plans. Thus, new savings into 401(k)s would no longer be possible. However, even in the absence of tax incentive plans such as 401(k)s, investors can choose to save in taxed accounts. We provide insight into the benefits of our plan versus such taxed savings alternatives by simulating how such taxed savings would grow under the rate of return assumptions of our simulations. In our simulation for taxed alternatives, we reduce the 6.25% of net compensation contributions by the tax credits foregone. We then grow these contributions at after-tax rates of return. The point of comparison to our plan is the values of the life annuities that come from these taxed savings added to expected Social Security benefits, without reduction, versus our plan's tax deferred life annuity plus the reduced Social Security benefits as we propose.

Our simulations assume that the contributions begin in 2009. Only workers subject to FICA tax participate. The workers would be eligible to begin drawing funds from the tax deferred accounts at the time they file for Social Security benefits. Withdrawals from the tax deferred accounts would not be available until meeting the requirements for a Social Security benefit, including disability, survivor benefits, and early retirement. At the time a benefit is applied for, the PIA would be adjusted as described above. The tax-deferred savings account would be the property of the worker and would transfer at death to his or her heirs or to the estate (under Ghilarducci's plan only half the assets in the GRA would transfer). The transfer would be either in the form of a life annuity and associated PIA reduction for survivors' benefits (as outlined above), or as some fraction of the account value as a lump sum. We propose the fraction to be the marginal tax rate of the beneficiary.

Anyone familiar with the power of compound interest over long periods of time understands the value of watching investment accounts grow on a tax deferred basis. Note that in contrast to current 401(k) type plans, our proposal does not impose any adjusted gross income (AGI) limits nor do we have any limits due to participation in other retirement plans.

### **Results for three sets of simulations**

We now examine the impact our proposal would have on three stylized sets of workers - young workers at various income levels, a second set of simulations for middle-aged workers at various income levels, and a third for older workers. Actual data is used up to 2006; the data was downloaded from the Social Security website - <http://www.ssa.gov>. After 2006, the CPI is assumed to grow at 3%, median compensation is assumed to grow at 3%, and the Social Security earnings cap is assumed to grow at 4.14% (the compound growth rate in the earnings cap was 4.14% for the period from 1996 through 2008). The bend points after 2009 are simulated as the same average percentage of the Social Security earnings cap as they exhibited for the period from 1996 through 2009. The tax credit is assumed to be \$618 in 2009 and to grow at 3% annually. The CPI adjustment factors used in calculating the AIME and PIA assume inflation of 3% per year. The simulations use accumulation phase rates of return on the tax-deferred investments of 0%, 3%, 5.7% and 10%. During the distribution phase, we use a 2.9% nominal rate and a thirty year term to simulate the amount of a life annuity payable at retirement. The

5.7% nominal rate and the 2.9% real return are consistent with the assumptions of the Social Security trustees (Board of Trustees, 2009) and close to the 3% real return used by Ghilarducci.

The tax-deferred contributions start in 2009 and, for purposes of the simulation, are assumed to be 6.25% of the compensation of the worker. All workers enter the workforce at age 22 and retire at age 67 (a 45 year working life). We simulate four levels of income for each set of workers. One approach has the worker earning 50% of median net compensation for each of the 45 years. The second has the worker earning the median net compensation for each year. A third simulation has the worker earn 50% of median compensation for five years, median compensation for the next five years, and then realize 5% raises each year for the following thirty-five years. We believe this to be the earnings stream that is our most realistic simulation. Finally, we model an earnings stream that has the worker earn 50% of median compensation for five years, median compensation for the next five years, and then realize 10% raises each year for the following thirty-five years. This last simulation creates a very high income earner in the last years of his or her working life. Thus, we establish a relatively low income earnings path, two middle-income paths, and a high income path. To provide some perspective, we note that for 2006 the Social Security earnings cap was \$94,200; median net compensation was \$24,892, and the 90<sup>th</sup> percentile for AGI was \$108,904

<http://www.taxfoundation.org/publications/show/250.html>).

The taxed savings alternatives reported in the tables use tax rates of 20% for low-income workers, 28% for middle income workers, and 40% for high income workers. We place 6.25% of compensation into these taxed accounts and grow these deposits at an after-tax rate of return calculated by multiplying the accumulation phase rate of return by  $(1 - t)$  where  $t$  stands for the tax rate. We reduce these taxed values by the values of the tax credits forgone. We assume these taxed accounts future values are used to purchase a thirty year term annuity at an interest rate of 2.9%.

Table 1 uses four panels, Panels a, b, c, and d to report the results of our simulations for young workers. These are workers entering the workforce at age 22 in 2008. Even at very low rates of

return during the accumulation period, these young workers are better off under our plan than they would be under current law regarding Social Security benefits.

Table 1 Panel a 22 years of age in 2008 Forty-five working years at 50% of median net compensation Income tax rate of 20% 6.25% of compensation into savings each year							
Monthly payments are based on a 30-year annuity at retirement using a 2.9% nominal rate of return during the distribution phase							
Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$3,745	\$315	\$63	6.73%	\$86	4.33%	1.68%
3%	\$3,745	\$555	\$111	11.85%	\$134	7.99%	2.96%
5.7%	\$3,745	\$1,021	\$204	21.81%	\$213	15.25%	5.45%
10%	\$3,745	\$3,163	\$633	67.58%	\$500	47.85%	16.90%

Panel a of Table 1 provides the results of our simulation for 22 year old low income workers. At the historically modest nominal return of 5.7% during the accumulation phase, these low income workers realize an improvement in their total benefit of more than 21% under our proposal when compared to projected Social Security PIA values. In comparison to the taxed saving alternative, again using 5.7% for the accumulation phase, our proposal provides these low income workers with increased benefits of 16.43%. Of particular interest to this paper is the observation that the reduction in PIA for these low income workers range from 1.68% to 16.91%, depending on the

Table 1 Panel b 22 years of age in 2008 Forty-five working years at median net compensation Income tax rate of 28% 6.25% of compensation into savings each year							
Monthly payments are based on a 30-year annuity at retirement using a 2.9% nominal rate of return during the distribution phase							
Nominal rate	PIA	Life annuity at	Reduction	Percentage	Monthly	Percentage	Percentage

of return during accumulation phase	current law	retirement under proposed plan	in PIA	increase in total benefit vs. current law	payment from the taxed savings alternative	increase in proposed plan total benefit vs. taxed savings alternative	reduction in PIA
0%	\$5,221	\$630	\$176	8.69%	\$401	0.94%	3.38%
3%	\$5,221	\$1,110	\$311	15.30%	\$595	3.50%	5.95%
5.7%	\$5,221	\$2,042	\$572	28.16%	\$896	9.38%	10.95%
10%	\$5,221	\$6,327	\$1,772	87.25%	\$1,891	37.46%	33.93%

<p style="text-align: center;">Table 1 Panel c  22 years of age in 2008  Five working years at 50% of median net compensation  Five working years at median net compensation  Thirty-five following years with 5% annual increases  Income tax rate of 40%  6.25% of compensation into savings each year</p>							
<p style="text-align: center;">Monthly payments are based on a 30-year annuity at retirement using a  2.9% nominal rate of return during the distribution phase</p>							
Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$6,394	\$907	\$363	8.51%	\$678	-1.89%	5.67%
3%	\$6,394	\$1,448	\$579	13.59%	\$869	0.00%	9.06%
5.7%	\$6,394	\$2,418	\$967	22.69%	\$1,118	4.43%	<b>15.13%</b>
10%	\$6,394	\$6,469	\$2,587	60.70%	\$1,775	25.78%	40.47%

realized rate of return during the accumulation phase. Panel b of Table 1 reports our results for workers entering the workforce in 2008 and earning the median compensation each year of the working life. The pattern is similar to that of Panel a of Table 1, but the advantages to our plan are higher in each result.

Our most striking results are reported in Panel c of Table 1. These are workers entering the workforce in 2008 and who earn 50% of median compensation for 5 years, the median

compensation for 5 years, and earn 5% annual raises thereafter. We argue that this is a realistic pattern of income and best captures the impact of our proposal. Using 5.7% as the reference return during the accumulation phase, young workers with this income pattern will earn a total benefit more than 22% greater than their projected PIA under current law. Furthermore, they will benefit by more than 11% in comparison to the taxed savings alternative. Most importantly, our proposal generates a reduction in PIA (at 5.7% return) of 15.13% for this typical income

Table 1 Panel d 22 years of age in 2008 Five working years at 50% of median net compensation Five working years at median net compensation Thirty-five following years with 10% annual increases Income tax rate of 40% 6.25% of compensation into savings each year							
Monthly payments are based on a 30-year annuity at retirement using a 2.9% nominal rate of return during the distribution phase							
Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$11,541	\$2,729	\$1,092	14.19%	\$2,500	-6.14%	9.46%
3%	\$11,541	\$3,738	\$1,495	19.44%	\$2,950	-4.88%	12.96%
5.7%	\$11,541	\$5,324	\$2,130	27.68%	\$3,490	-1.97%	18.45%
10%	\$11,541	\$11,033	\$4,413	57.36%	\$4,765	11.38%	38.24%

pattern (reported in bold). We note that the 2009 report of the Social Security trustees (Board of Trustees, 2009) reported that one solution to the Social Security funding crisis is an immediate reduction in benefits of 13.3%. While our proposal does not generate immediate reductions of this magnitude for all workers, we do achieve reductions of this magnitude given sufficient lead times (i.e., for younger workers).

Panel d of Table 1 reports our results for young workers that turn out to be high income earners in the later years. For workers who follow the income pattern given in Panel d, their end year compensation at age 67 is approximately ten times the forecast median compensation in 2052 when they will retire. For such high income workers, the benefits of our proposal are clear.

Table 2 is also in four panels, Panels a through d. Table 2 looks at workers who are 34 years old in 2008. These workers are simulated to have a working career of 45 years and retire in 2041. The income levels for the four panels are as described in the four panels of Table 1. The patterns in Table 2 are quite similar to those reported in Table 1 but the magnitudes of the effects are reduced. This is to be expected as these 34 year olds have twelve fewer years of compound interest working on the tax deferred savings accounts. Using 5.7% return as a representative rate of return during the accumulation phase, Panel c of Table 2, simulating what we consider to be our most typical earner, shows a reduction in Social Security PIA of 14.00% (reported in bold). For all panels of Table 2, the reduction in PIA lies between 2.30% and 29.55%.

Table 3 gives the results of our simulation for older workers. These are workers who are 56 in 2008 and who will retire in 2019 after 45 years of work. Note that there are positive but comparatively small benefits to these workers from participation in our proposal. For higher income older workers (Panels c and d), at low rates of return during the accumulation period, our proposal generates a small negative position relative to traditional taxed savings. This reflects the fact that at low rates of return the value of the tax credit and tax deferral does not compensate for the reduction in PIA. Reductions in PIA for Table 3 range from 0.73% to 9.84%. Once again using 5.7% as the reference accumulation phase return, Panel c of Table 3 shows that the value of the life annuity is \$149 per month and the reduction in PIA \$60 per month. Thus, these workers are better off by 5.07% compared to current Social Security promises. However, the reduction in PIA is only 3.38% (reported in bold) and these workers would be indifferent between our proposal and traditional taxed savings.

Table 2 Panel a 34 years of age in 2008 Forty-five working years at 50% of median net compensation Income tax rate of 20%
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6.25% of compensation into savings each year							
Monthly payments are based on a 30-year annuity at retirement using a 2.9% nominal rate of return during the distribution phase							
Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$1,612	\$186	\$37	9.22%	\$51	5.89%	2.30%
3%	\$1,612	\$275	\$55	13.63%	\$69	8.97%	3.41%
5.7%	\$1,612	\$411	\$82	20.41%	\$94	13.77%	5.10%
10%	\$1,612	\$852	\$170	42.26%	\$164	29.14%	10.56%

Table 2 Panel b 34 years of age in 2008 Forty-five working years at median net compensation Income tax rate of 28% 6.255% of compensation into savings each year							
Monthly payments are based on a 30-year annuity at retirement using a 2.9% nominal rate of return during the distribution phase							
Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$2,718	\$372	\$104	9.84%	\$236	1.05%	3.83%
3%	\$2,718	\$550	\$154	14.56%	\$312	2.78%	5.66%
5.7%	\$2,718	\$823	\$230	21.80%	\$410	5.82%	8.48%
10%	\$2,718	\$1,704	\$477	45.13%	\$668	16.50%	17.55%

Table 2 Panel c  
 34 years of age in 2008  
 Five working years at 50% of median net compensation  
 Five working years at median net compensation  
 Thirty-five following years with 5% annual increases  
 Income tax rate of 40%  
 6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
 2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$3,303	\$571	\$228	10.37%	\$435	-2.49%	6.91%
3%	\$3,303	\$805	\$322	14.63%	\$527	-1.14%	9.76%
5.7%	\$3,303	\$1,156	\$462	21.00%	\$637	1.43%	<b>14.00%</b>
10%	\$3,303	\$2,252	\$901	40.92%	\$893	10.92%	27.28%

Table 2 Panel d  
 34 years of age in 2008  
 Five working years at 50% of median net compensation  
 Five working years at median net compensation  
 Thirty-five following years with 10% annual increases  
 Income tax rate of 40%  
 6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
 2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$6,899	\$1,836	\$734	15.97%	\$1,701	-6.97%	10.64%
3%	\$6,899	\$2,347	\$939	20.41%	\$1,945	-6.08%	13.61%
5.7%	\$6,899	\$3,056	\$1,222	26.58%	\$2,226	-4.30%	17.72%
10%	\$6,899	\$5,096	\$2,038	44.32%	\$2,842	2.21%	29.55%

Table 3 Panel a  
 56 years of age in 2008  
 Forty-five working years at 50% of median net compensation  
 Income tax rate of 20%  
 6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
 2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$1,112	\$41	\$8	2.92%	\$11	1.90%	0.73%
3%	\$1,112	\$46	\$9	3.32%	\$12	2.19%	0.83%
5.7%	\$1,112	\$52	\$10	3.74%	\$13	2.50%	0.94%
10%	\$1,112	\$63	\$13	4.54%	\$16	3.09%	1.14%

Table 3 Panel b  
 56 years of age in 2008  
 Forty-five working years at median net compensation  
 Income tax rate of 28%  
 6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
 2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$1,580	\$81	\$23	3.70%	\$52	0.42%	1.44%
3%	\$1,580	\$92	\$26	4.21%	\$57	0.65%	1.64%
5.7%	\$1,580	\$104	\$29	4.74%	\$62	0.80%	1.84%
10%	\$1,580	\$126	\$35	5.76%	\$71	1.22%	2.24%

Table 3 Panel c  
56 years of age in 2008  
Five working years at 50% of median net compensation  
Five working years at median net compensation  
Thirty-five following years with 5% annual increases  
Income tax rate of 40%  
6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$1,767	\$117	\$47	3.99%	\$88	-0.94%	2.66%
3%	\$1,767	\$133	\$53	4.52%	\$95	-0.80%	3.01%
5.7%	\$1,767	\$149	\$60	5.07%	\$101	-0.62%	<b>3.38%</b>
10%	\$1,767	\$180	\$72	6.12%	\$113	-0.25%	4.08%

Table 3 Panel d  
56 years of age in 2008  
Five working years at 50% of median net compensation  
Five working years at median net compensation  
Thirty-five following years with 10% annual increases  
Income tax rate of 40%  
6.25% of compensation into savings each year

Monthly payments are based on a 30-year annuity at retirement using a  
2.9% nominal rate of return during the distribution phase

Nominal rate of return during accumulation phase	PIA current law	Life annuity at retirement under proposed plan	Reduction in PIA	Percentage increase in total benefit vs. current law	Monthly payment from the taxed savings alternative	Percentage increase in proposed plan total benefit vs. taxed savings alternative	Percentage reduction in PIA
0%	\$2,998	\$499	\$199	9.98%	\$469	-4.90%	6.65%
3%	\$2,998	\$559	\$223	11.18%	\$502	-4.76%	7.45%
5.7%	\$2,998	\$621	\$248	12.42%	\$533	-4.56%	8.28%
10%	\$2,998	\$738	\$295	14.76%	\$590	-4.10%	9.84%

Table 4 Weighted average reduction in PIA based on 2006 empirical distribution function of Social Security benefits		
Age in 2008	Rate of return during accumulation phase	Percentage reduction in PIA
22	0%	3.39%
22	3%	5.97%
22	5.7%	<b>10.99%</b>
22	10%	34.06%
34	0%	4.10%
34	3%	6.06%
34	5.7%	<b>9.07%</b>
34	10%	19.55%
56	0%	1.41%
56	3%	1.61%
56	5.7%	<b>1.81%</b>
56	10%	2.20%

The Social Security Administration reports the distribution of retirement benefits for 2006 (<http://www.socialsecurity.gov/policy/docs/statcomps/supplement/2007/5b.html#table5.b6>). We used this empirical distribution of benefits to impute the associated distribution of AIME for 2006. We used the midpoints of the reported intervals and standardized the results by dividing by the median net compensation for 2006. We then applied this empirical distribution function of income relative to median income in our simulations. Assuming the 2006 EDF continues to hold, we calculated the distribution of benefits for each of our three sets of workers. Table 4 reports the weighted average percentage reduction in PIA for our simulations. Using the 5.7% reference rate, for our 22 year old workers the weighted average reduction in PIA is 10.94%. For the 34 year olds, at a 5.7% accumulation phase rate, the reduction in PIA is 9.07%. For older workers, with less time to benefit from the power of compound interest, the reduction in PIA is only 1.78% at that 5.7% accumulation phase rate of return.

## **Impact on Social Security**

Tax revenue to the U.S. Federal government has been approximately eighteen percent of GDP since World War II (Citizen's Guide, 2008). Projections are that by 2040, spending on just three Federal programs, Social Security, Medicare, and Medicaid, along with interest on the Federal debt will exceed this eighteen percent level (Board of Trustees, 2009). To continue to support the current functions of the federal government – defense spending, the courts, the EPA, HUD, all other U.S. Government functions – will require tax revenue significantly in excess of 18% of GDP. The tax rates needed in the future to fully support the continued functions the Federal government engages in today may well prove unacceptably high to the workers of 2040.

As an alternative, the government could reduce these social programs by reducing their promised benefits. However, this has proved politically difficult to do in the past and will likely remain difficult to do in the future. Our plan offers a partial and important solution to this developing funding crisis.

Admittedly, our plan is not a complete solution. Our plan has little power to resolve the near term crisis. However, for those workers retiring twenty or more years into the future, the power of compound interest on sustained investment streams at reasonable rates of returns allows our plan to provide dramatic reductions in Social Security underfunding.

Looking at Panel c of each of the three tables, we can get a sense of the impact on Social Security from adopting our proposal. Panel c uses the income pattern we consider most representative of a typical worker. For the 22 year old worker of Table 1, Panel c of Table 1 shows that these workers will have substantially improved retirement income even if they experience very low rates of return during the accumulation period. We also observe substantial reductions in Social Security obligations. These results highlight the power of compound interest over long periods of time. Using the 5.7% nominal rate assumption of the Social Security trustees (Board of Trustees, 2009), Panel c of Table 1 shows a 15.13% reduction in PIA. Using a 10% return during the accumulation phase, the reduction in PIA is 40.47%. It is worth noting that the average return since 1926 for U.S. equity markets has been about 14%. If

that history repeats over the next half-century, Social Security will not only not be underfunded, but will have sufficient reduction in benefits that the payroll tax can be cut or directed towards other programs such as Medicare or debt reduction.

Panel c of Table 2 tells a similar story for our 34 year old worker. At 5.7% rate of return during the accumulation period, our plan creates increased benefits of 21% versus current Social Security promises. Our plan is more attractive than the taxed savings alternative. Our plan indicates that Social Security benefits are reduced by 14% when these workers retire in 2041.

Unfortunately, our proposal does little to increase the retirement security of the 56 year old workers reported in Table 3. Panel c of Table 3 indicates that increases in benefits under our plan for these older workers range from 3.99% to 6.12%. Reductions in PIA are small, ranging from 2.66% to 4.08%. At low rates of return during the accumulation phase, these older workers would be better off investing in the taxed alternative than investing in our proposed tax-deferred accounts. At low rates of return, the tax advantages embedded in our plan fail to outweigh the reductions in PIA. For higher income older workers, Panel d of Table 3, the relative underperformance of our plan versus traditional savings exists at each level of rates of return during the accumulation phase.

We share many of Teresa Ghilarducci's (2007) concerns regarding the disparate impact of 401(k) plans on differing income classes. As she reports, the benefits of current 401(k)s are disproportionately to the wealthy. We also note her concerns that so few of lower income workers are taking advantage of 401(k) and other such retirement plans. This lack of preparation for retirement among the general population is indeed distressing. Ghilarducci (2007) uses a tax credit of \$600 in 2008 as an offset to her mandatory GRA costs. We adopt her approach although we differ from Ghilarducci in that in our plan all contributions come from the worker. Ghilarducci has the contributions split half-and-half between the worker and the employer. We differ from Ghilarducci in that we prefer that the social benefit from such tax advantaged retirement plans be focused on increasing the viability of Social Security rather than reducing income inequality. We would take little comfort from any plan that marginally reduced income

inequality, while the burden Social Security places on the Federal budget causes the very existence of Social Security to come into doubt by the time today's young workers reach retirement age.

The current limitations on today's retirement schemes appear, to us, to be driven by a concern for social equity – as a people, apparently, we Americans do not want the bulk of the benefit of such plans to go to just a small number of high-income workers. While we would expect our plan to indeed be quite attractive to younger workers who attain high income levels prior to retirement, and thus seem to run afoul of this social equity notion, we believe that the social benefit of our plan – solution of the Social Security underfunding crisis – will make our plan politically palatable.

We believe our plan would encourage an increase in the national savings rate. While critics question the validity of some of the reported statistics regarding the U.S. savings rate, the reported numbers since 2005 show a savings rate of less than 1%, with the exception of the second quarter of 2008 which came in at about 2.5% (Bureau of Economic Analysis, 2008, <http://www.bea.gov/briefrm/saving.htm>). Some recent evidence suggests that Americans are responding to the economic crisis of 2009 by increasing their savings (<http://online.wsj.com/article/SB123120525879656021.html>). We argue that the current restrictions on saving for retirement imposed on higher income workers works to reduce the national savings rate. By mandating all workers save in a tax-deferred account, without imposing AGI or other limits, we create a significant pool of new investment capital. Recall that for both Roth IRAs and traditional IRAs, maximum contributions are limited and the availability of the plans removed at relatively low AGI. 401(k)s and other qualified plans impose contributions restrictions and earnings restrictions that reduce the attractiveness of such plans to high income earners. Nonqualified plans (Rabbi trusts, incentive stock options, etc.) are structured to be attractive precisely to high income earners. The number of workers able to participate in nonqualified plans is limited due to “top hat” restrictions. Our plan eliminates these disincentive effects, creating a much more robust retirement environment.

## **Conclusions**

As the baby boom generation of Americans approaches retirement, concerns about the viability of the U.S. Social Security system abound. Private sources of retirement income are also in flux. Companies are cancelling defined benefit plans or substituting defined contribution plans in their stead. However, defined contribution plans, such as 401(k)s, exhibit serious deficiencies. In particular, participation in 401(k) plans is skewed towards higher income employees. Risk of underperformance of investment in DC plan is borne by the worker. The tax expenditures associated with 401(k)s are judged to have failed to achieve the desired social benefit of secure retirement for large numbers of U.S. workers.

We propose a reform of U.S. retirement policy that solves these deficiencies. Following the lead of Teresa Ghilarducci (2007), we redirect 401(k) tax expenditures into mandatory retirement savings accounts. We modify her proposal by making the social benefit of these redirected tax expenditure to be increasing the solvency of the U.S. Social Security system.

## References

Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Funds (2009). The 2009 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Federal Disability Funds, May 12, 2009.

Citizen's Guide (2008). The Federal Government's Financial Health: A Citizen's Guide to the 2008 Financial Report of the United States Government.  
<http://www.gao.gov/financial/citizensguide2008.pdf>

Diamond, Peter A. and Peter R. Orszag (2005). Saving Social Security. *Journal of Economic Perspectives* V 19, pp. 11-32.

Feldstein, Martin and Andrew Samwick (2001). Potential Paths of Social Security Reform, NBER Working Paper No. 8592, November 2001.

Feldstein, Martin and Elena Rangelova (2001). Individual Risk in an Investment-Based Social Security System, *American Economic Review*, Vol. 91 Issue 4, pp.1116-1125, September 2001.

Ghilarducci, Teresa (2007). Guaranteed Retirement Accounts: Toward Retirement Income Security. Economic Policy Institute Briefing Paper No. 204, November 20, 2007.

Hewitt Associates (2008). Survey Findings: Hot Topics In Retirement 2008. Hewitt Associates LLC, Lincolnshire, IL.

Nataraj, Sita and John B. Shoven (2003). Comparing the Risks of Social Security with and without Individual Accounts. *The American Economic Review*, V 93, pp. 348-353.

Nofsinger, John R. (2008). *The Psychology of Investing*, Third Edition. Pearson Prentice Hall.

Schieber, Sylvester J. and John B. Shoven (1996). Social Security Reform: Around the World in 80 Ways. *AEA Papers and Proceedings*, V 86, pp. 373-377.

Spitzer, Eliot (2009). Privatize Social Security?! Can We Finally Kill this Terrible Idea? <http://www.slate.com/id/2210414>, February 4, 2009.

Tanner, Michael (2004). The 6.2 Percent Solution: A Plan for Reforming Social Security. *Cato Project on Social Security Choice*, Cato Institute Social Security Paper No. 32, February 17, 2004.

United States Government Accountability Office (GAO) (2007). Social Security Reform: Greater Transparency Needed about Potential General Revenue Financing. Report to Congressional Committees, GAO-07-213, March 2007.

Walker, David (2008). Call this a Crisis? Just Wait. *Fortune*, Vol. 158 Issue 9, pp. 119-120, November 10, 2008.

## Appendix

In this appendix, we provide partial printout from our spreadsheet calculations. For the example below, we use a worker born in 1986 who enters the workforce in 2008 at age 22. The worker is assumed to earn 50% of the median net compensation for five years, then earn the median compensation for the next five years, and then receive 5% per year raises until retirement. We have the worker make his first contribution into our proposed tax deferred retirement account in 2009. The worker retires at age 67 in 2053. We simulate (forecast) the worker's AIME and PIA in the year of retirement. We also simulate the future values of the savings account in 2053 at various accumulation phase rates of return. We report the monthly payments for a thirty year annuity at a 2.9% rate of return (compounded monthly). We report the monthly payments for a thirty year annuity at a 2.9% rate of return (compounded monthly) for the taxed savings alternative. We use a tax rate of 40% for this age and income combination.

Year	Median Net Compensation	Forecast earnings stream	Indexed Earnings	Contributions at 6.25% of compensation	Lesser of tax credit or contribution	Average of top 35 indexed earnings
2008	\$26,407	\$13,204	\$49,930		n/a	\$143,844
2009	\$27,199	\$13,600	\$49,930	\$850	618	Forecast AIME
2010	\$28,015	\$14,008	\$49,930	\$875	637	\$11,987
2011	\$28,856	\$14,428	\$49,930	\$902	656	

2012	\$29,721	\$14,861	\$49,930	\$929	675	Forecast break points
2013	\$30,613	\$30,613	\$99,861	\$1,913	696	\$4,411 and \$26,586
...	...	...	...	...	...	
2051	\$94,128	\$181,005	\$192,028	\$11,313	2,139	Forecast PIA in 2053
2052	\$96,952	\$190,055	\$195,757	\$11,878	2,203	\$6,394

Rate of return during accumulation period	Future value of tax- deferred contributions	Monthly payments, tax-deferred approach, 30 year annuity, 2.9% rate	Future value of taxed alternative	Monthly payments, taxed alternative, 30 year annuity, 2.9% rate
0%	\$217,939	\$907	\$162,907	\$678
3%	\$347,911	\$1,448	\$208,748	\$869
5.7%	\$580,969	\$2,418	\$268,702	\$1,118
10%	\$1,554,093	\$6,469	\$426,446	\$1,775