The portfolio implications of adding Social Security private account options to ongoing investments

Joseph Friedman, Ph.D.[a],*, Herbert E. Phillips, Ph.D.[b]

[a]*Department of Economics, Temple University, Philadelphia, PA 19122, USA*
[b]*Department of Finance, Temple University, Philadelphia, PA 19122, USA*

Abstract

Proposals to allow private accounts under Social Security were introduced long before George Bush was elected President, and support for privatization in some form will survive his administration and the economic downturn that followed. This paper studies the impact that private accounts would have on risk/return investment tradeoffs available to Social Security participants who save and invest on an ongoing basis outside the Social Security system. For such investor/participants, we show that the reduction in total diversifiable risk afforded by traditional Social Security accounts would be more than sufficient in many cases to compensate for the opportunity cost of opting-out of a privatization program if one were enacted. The risk of financing private accounts by diverting mandatory contributions away from guaranteed benefit accounts, on the other hand, would be proportionately higher for those with little or no private savings or investments outside the Social Security system. The paper concludes, therefore, that privatization would lead to imprudent risks being borne by those who can least afford to do so, and would offer no significant advantage to others. © 2009 Academy of Financial Services. All rights reserved.

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1. Introduction

There have been many proposals to allow Social Security participants to divert a portion of their FICA (Federal Insurance Contributions Act) tax payments into Social Security Private Accounts (henceforth: Private Accounts) that would be under their control. This

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* Corresponding author. Tel.: +1-215-204-8142.
E-mail address: jfriedman@temple.edu (J. Friedman).

paper considers the impact that Private Accounts would have on feasible risk-return investment tradeoffs available to participants who, in addition to their periodic contributions to traditional Social Security accounts, also contribute to private savings and investment retirement accounts held outside the Social Security system

In the absence of Private Accounts, a participant's total periodic contributions to retirement savings accounts might be simply dichotomized between contributions to risky and/or riskless assets accounts held outside the Social Security system and the payroll tax–all of which is allocated to a traditional Social Security account. The introduction of Private Accounts would complicate this dichotomy by permitting participants to divert a portion of their FICA taxes from riskless traditional Social Security accounts to risky Private Accounts.

Diverting a portion of one's FICA tax from a riskless traditional Social Security account to a Private Account introduces risk where none existed before; thus total portfolio risk must increase. The constraints and limitations on how contributions to a Private Accounts may be invested, moreover, preclude the possibility that Private Account assets would or could be efficiently diversified. Thus, all other things equal, the degree of non-diversifiable total portfolio risk resulting from periodic contributions to risky retirement accounts held both inside and outside the Social Security system, should be lower for those accounts held outside the system–where there are fewer asset allocation constraints, and thus fewer impediments to diversification.

The inclusion of a riskless asset in any portfolio of risky assets would yield risk reducing diversification benefits. This paper shows that the opportunity cost of opting out of a privatization program may be offset by the risk- reducing diversification benefits afforded by traditional Social Security accounts. The paper also shows that the potential diversification benefits afforded by allocations made to traditional Social Security accounts are higher for participants who, in addition to their FICA tax payments, have high propensities to save and invest for retirement outside the Social Security system. Private Accounts, by contrast, offer participants with lower propensities to save higher expected returns in exchange for investment risk that they are less able to diversify away. On the heels of the 2008 financial meltdown, this and other findings reported in this paper take on new meaning and relevance. It would follow, therefore, that current debates regarding the efficacy of Private Accounts should be extended beyond the political arena, and should consider the financial consequences of allowing private accounts under Social Security.

2. Background and review

Proposals for the introduction of Private Accounts were not born with the Bush Administration.[1] While unlikely to be seriously proposed under current (2009) market conditions, it seems likely to suppose that the privatization issue will be raised anew once the economy improves and security markets rebound.

The Social Security system's financial solvency, according to Crane (1997, p. 2) depends of various demographic factors. For example:

... the birth rate at the time of the creation of Social security was 2.3 but had risen to 3.0 by 1950. Today it is 2.1. The average life expectancy in 1935 was 63 and today (written in 1997) it is 75.

Not surprisingly, therefore, the payroll tax has increased from a total of 4% on employee and employer contributions on the first $300 of annual income in 1935, to a total of 12.4% on the first $102,000 of income in 2008. It is generally agreed that funding and solvency issues exist and need to be addressed; it is in this framework that Crane builds a case for privatization. While it is not the purpose of this paper to debate issues having to do with the financial solvency of the Social Security system, it seems appropriate to point out that Social Security privatization proposals have rarely been presented in such an eminently sensible–albeit apolitical–way.

The late Senator Barry Goldwater, for example, in a standard 1964 presidential campaign stump speech, offered privatization as a means for increasing the rate of return on mandatory FICA payroll tax payments, but this argument did not gain much traction–especially during the period of the "great society" that followed President Lyndon Johnson's landside victory in 1964. President Bush, better supported by modern media professionals than the late Senator Goldwater was, seeking the support among financial have-nots, spoke instead of an "ownership society." It was left for Nobel laureate Gary Becker (2005), however, to get to the crux of the Goldwater-Bush arguments with a simple observation: *"there are no freebies, ... higher return ... is related to ... greater risk and other tradeoffs."* We credit Gary Becker, and this simple observation, for motivating this paper.

Much of the debate regarding the privatization proposal is specifically directed at those with little or no investment experience. During an April 2005 press conference, for example, President Bush stated:

> I know some Americans have reservations about investing in the stock market, so I propose that one investment option consist entirely of Treasury bonds, which are backed by the full faith and credit of the United States government (2005).

While some can be expected to take President Bush's conclusion that the inclusion of Treasuries would "make voluntary personal retirement accounts a safer investment" (ibid.) at face value, others would feel compelled to ask: "Safer than what?" Treasury securities are free from default risk, but are not free from interest rate and inflation risks.

As presently envisaged, the privatization proposal would allow participants below the age of 55 to invest as much as 4% of their periodic 6.2% FICA tax payments, or roughly 64.5%, in Social Security Private Accounts, but, as is never mentioned in sound bites targeted at individual participants, there will be an "offset." As Schneider (2006) reports: "every dollar diverted ... plus interest at a rate of 3% after inflation, would be deducted from guaranteed Social Security payments." By this algebra, regardless of the implicit rate of return on a traditional Social Security account, a 3% real rate of return on Private Accounts would be required just to breakeven. Because of the offset, regardless of which investment option is chosen,[2] the ex ante risk associated with a Private Accounts is necessarily higher than the investment risk on an identical investment made in any tax deferred account (such as in an IRA) held outside the Social Security system.

On further review we find that the terms "risk" and "risk-return tradeoffs" are being

bandied about by both supporters and opponents of the privatization proposal in apparent disregard of the very specific meanings attached to them elsewhere in the literature and in the law–as in the 1974 Employment Retirement Security Act of 1974 (ERISA). ERISA's Prudent Man Rule[3] is based on a single-period portfolio risk-return expected utility maxim due to of Markowitz (1952), later extended by Samuelson (1969) to include a multiple-period generalization, and Merton (1969, p. 247) who examines the combined issue of optimal portfolio selection and consumption.

Hubbard (1985, p. 53) points out that: "In addition to changes in intertemporal consumption-savings decision induced by mandatory Social Security holdings, there may be significant reallocation on nonpension wealth." Reichenstein (1998) picked up on this point by considering the asset mix of a total portfolio, including retirement and non-retirement assets. Fraser, Jennings and King (2000, p. 296), in turn, ask: "how . . . proper valuation" of traditional "Social Security affect(s) the asset mix of a financial portfolio?" Even in the absence of Private Accounts, that none of these authors seemed to anticipate,[4] this valuation question is more easily asked than answered.

It is sometimes argued that traditional Social Security benefits and the returns on Treasury Inflation Protection Securities (TIPS) are similar in that, in either case, future cash flows are measured in real terms and backed by the full faith and credit of the Unites States Government. In advancing this argument, unfortunately, the point is sometimes overlooked that the initial valuation and subsequent inflation adjustment algebra and logic employed are markedly different, and that the maturity characteristics of a traditional benefit stream is determined by life expectancy of a beneficiary and/or a second to die in case of a spousal claim–rather than fixed in terms contained in a Treasury bond indenture. On the other hand, to the extent that two alternate, inflation adjusted, cash flow streams are backed by the full faith and credit of the United States government, each may be viewed as a return on quasi-riskless asset–but not necessarily as equivalent proxies, sporting similar implications.

When Social Security benefit payments are initiated, the beneficiary's initial Social Security benefit is calculated by adjusting life-time contributions to the growth in the average wage. Once the initial benefit is determined, subsequent benefits are then adjusted for inflation so as to preserve their purchasing power for the life of the beneficiary–not simply for a predetermined period to maturity, as in the case of TIPS. Not only do the "cash flows from TIPS and Social Security depend on different versions of CPI" (ibid., p. 300), but the dates and consequences of maturity are entirely different.

The use of TIPS yields, as proxy for the implicit yields on traditional Social Security accounts, should be called into further question because of uncertainty about how benefits will be indexed in the future. Robert C. Pozen's progressive indexing proposal (Pozen, 2005), for example, would change the Social Security benefit adjustment logic from real wage indexing to real price indexing.

Fraser, Jennings and King (2009) were, nevertheless, correct in supposing that a rational investor-participant should view a mandatory Social Security contract as a variant form of asset that should be accounted for in total portfolio asset-mix decisions. We expand upon this argument by first noting that the benefits are subject to periodic adjustment, and that the actual benefit outcomes are generally not correlated with current financial market rates of return. Thus, whether viewed as a return on a deferred annuity contract or an investment

asset, the implicit rate of return on traditional payments may be likened to returns on a quasi-riskless asset. Fraser, Jennings and King (2009) treated a Social Security benefit contract as a variant form of asset; we go further by treating it as a quasi-riskless asset, and, as such a source of risk reducing, diversification benefits.

3. Experimental logic, data selection, definitions, and design

The purpose of this paper is to weigh the advantages and disadvantages of investing in Private Accounts for participants who contribute regularly to retirement savings-investment accounts outside the Social Security system. As such Private Accounts do not presently exist, their ex post effects on participant retirement portfolio risk-return tradeoffs cannot be observed empirically, but can be simulated with the aid of a suitably chosen set of securities market data. But what constitutes "a suitably chosen" data set, and by what standard should the experimental results be evaluated?

Taking a page from the literature of experimental design and measurement (Koopmans, 1947), we begin by posing the opposite of what we believe to be true in the form a proposition, and do so in such a way as to know what to expect if the proposition being tested happens to be true. We then select a data period for the experiment that will afford the proposition every advantage–that is, minimize the likelihood that it will be falsely rejected.

3.1. A testable counter proposition

According to Private Accounts proposals, participants should be allowed to divert a portion of their periodic FICA taxes from traditional accounts to risky Private Accounts investments. For those who choose to invest in Private Accounts, total portfolio risk will rise unless compensating investment transactions are made in accounts held outside the Social Security system. If at the margin, however, superior returns on the incremental risks associated with Private Accounts are available outside the Social Security system then rational participants should opt-out.

The notion that participants may benefit by investing in Private Accounts implies that the total portfolio risk required to achieve any feasible total portfolio rate of return will be lower for those who opt-in than for those who opt-out of Private Accounts. Believing this not to be the case, we consider the following counter proposition and demonstrate significant evidence to the contrary which justifies its rejection:

Counter proposition: **The introduction and funding of Social Security Private Accounts will result in improved risk-return tradeoffs for efficiently diversified retirement portfolios**

In our model we contrast the total portfolio, risk-return tradeoff, implications of opting-in versus opting-out, using a securities market data history that should favored the proposition. It should be noted, therefore, that the data set was selected to serve as a basis for this test and not to predict the future.

3.2. Sampling period selection and experimental design

The investment options currently offered under privatization proposals include three mutual fund alternatives: a stock mutual fund, a corporate bond fund, and a Treasury bond fund.[5] For ease of presentation, analysis, and data collection, we assume that investor-participants may invest Private Accounts balances in the Standard & Poor's 500 Stock Index (henceforth, S&P 500), in a long-term Treasury securities fund (henceforth, LT Treasury), or in an equally weighted mix of the two.

Systematic Private Accounts contributions, consistent with either the S&P 500 opinion, the LT Treasury option, or any combination of the two, for the 10-year period starting January 1984 and ending December 1993, a period of sustained economic and stock market growth, would have resulted in ex post financial gains at least as high as for any other 10-year period for which data are available. If, for such a period, it can be demonstrated that the introduction and funding of Private Accounts would result in poorer, rather than improved, total portfolio, risk-return then it would follow that the counter proposition is false, and that evidence to that effect would be even stronger had a different sample period–representing more typical economic and securities markets conditions–been selected. The selection of such a sample period outlier, therefore, provides maximum protection to the proposition under consideration in the sense that should it fail for such an atypical period, by definition of an outlier, it would fail in general.

Accordingly, data for this illustration were obtained from the Center for Research in Security Prices (CRSP) NYSE-AMEX and NASDAQ tapes, for the 120-month period starting January 1984 and ending December 1993 and dividend adjusted rates of return were calculated. Monthly rates of return on Long-Term Treasury Securities covering the same period were obtained from the 2003 Ibbotson Associates Historical Data File.

3.3. Portfolio optimization, risk preference, and the set of feasible investment options

The set of all combinations of stocks whose calculated means and standard deviations satisfy these efficiency criteria were identified using numerical methods due to Markowitz (1952), and are represented by points that plot along the efficient frontier shown in Fig. 1. Assuming that rational investor-participants are guided by the same mean-standard deviation efficiency criteria[6] envisaged by ERISA's Prudent Man Rule, every optimizing investor participant would wish to select an efficient portfolio represented by that point on the efficient frontier that best reflects his or her risk-return tradeoff preference.

The means and standard deviations that label the axes in Fig. 1 are represented by annualized equivalents.[7] Five marked points are shown in Fig. 1: Points A, B, and C represent portfolios that are on the efficient frontier, and points D and E represent investment options that are located elsewhere in the feasible region. Point A, whose coordinates are (11.39%, 6.65%), identifies the least risky efficient portfolio that can be found based on the chosen sample. Points B and C, whose coordinates are (14.05%, 6.90%), and (15.26%, 7.06%), respectively, are reached by moving up and to the right, away from Point A, along the efficient frontier–by trading higher target rates of return for the greater risk. Points D and E, by contrast, which are not located on the efficient frontier, correspond to pure investments
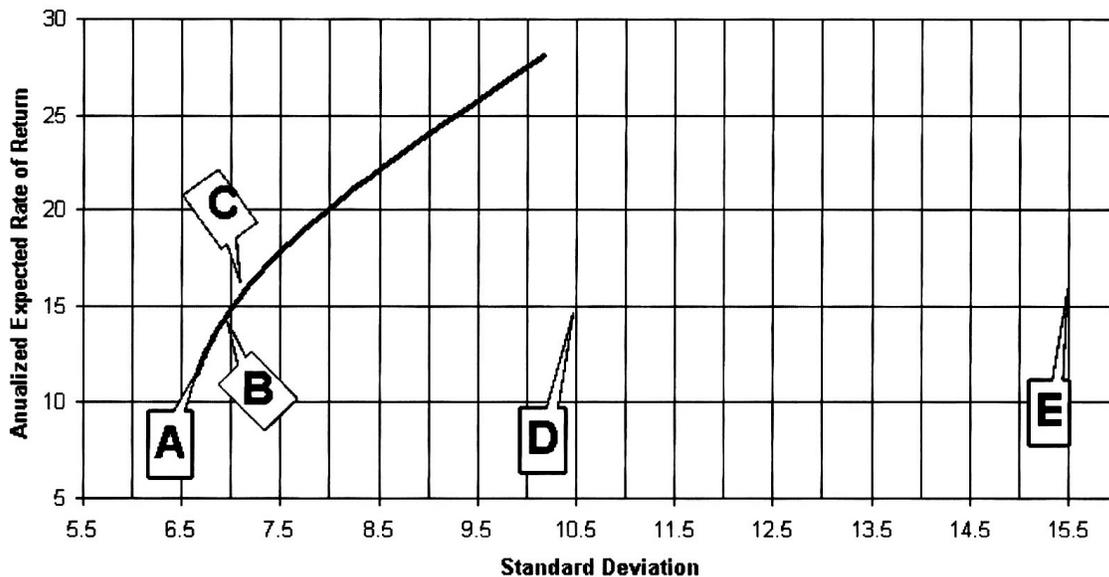
Fig. 1. Efficient frontier: Periodic investment outside Social Security.

in LT Treasury and S&P 500 stock accounts, respectively. We see from the figure that Point D, whose coordinates are (14.05%, 10.30%), lies directly to the right of Point B, and Point E, whose coordinates are (15.23%, 15.57%), lies directly to the right of Point C. Thus, according to the Markowitz efficiency criteria, option (C) is preferred to option (E), and option (B), which corresponds to an efficiently diversified collection of risky assets, is preferred to option (D)–a pure investment in LT Treasury securities. This last result is especially interesting in light of President Bush's previously cited remark:

> I know some Americans have reservations about investing in the stock market, so I propose that one investment option consist entirely of Treasury bonds, which are backed by the full faith and credit of the United States government (Bush, 2005).

3.4. Variables of classification used in the experiment

To facilitate the analysis, a clear distinction should be drawn between a participant's stock of financial assets and periodic additions to retirement assets by saving and investment. From the point of view of very wealthy individuals, for example, while neither present nor future Social Security cash flow may significantly affect total wealth, period by period allocation of FICA taxes may nevertheless significantly affect total retirement portfolio rates of return and risk-return tradeoffs. Periodic FICA tax allocation decisions made by less wealthy individuals, by contrast, may significantly affect both retirement wealth, and current period portfolio risk-return tradeoffs. This paper focuses on risk-return tradeoffs that result from periodic saving and investment cash flows, not total wealth assets that we have no way of adjusting for in the experiments. We define cash flow balances ratios used in the experiment, accordingly.

3.4.1. The Social Security discretionary balance

According to privatization proposals, participants would be granted discretionary control over the allocation of approximately two-thirds of their 6.2% FICA tax. This discretionary amount might be invested in a Private Account or directed to a traditional Social Security benefit account–at the discretion of the participant. We call this amount a *Social Security Discretionary Balance* (abbreviated, SSDB). One's decision to contribute to a Private Account would effectively determine the allocation of Social Security Discretionary Balance, but would have no affect on the allocation of the remaining portion of the employee's FICA tax amount; the remaining portion must be directed to a traditional Social Security benefit account. Privatization would effectively dichotomize the FICA tax amount into two components: one over which the participant has no discretionary control and a second, the Social Security Discretionary Balance, over which the participant has discretionary control.

The FICA tax for someone who earned an annual salary of $102,000 or more in 2008, for example, would have been $6,324. Under current law, 100% of this amount, in addition to an equal amount paid by the employer, would be directed to a traditional Social Security account. Suppose that Congress had approved legislation, effective January 1, 2008, allowing participants under the age of 55 to direct as much as 4% of the 6.2% FICA tax, or roughly 64.5%, to a Private Account–then the Social Security Discretionary Balance for a participant earning $102,000 or more in calendar year 2008 would be: Social Security Discretionary Balance = (0.645161) $6,324 = (0.04) $102,000 = $4,080. In this case, taking account of the employers FICA tax as well as the employee's tax amount, $7,850 (i.e., $12,650 to $4,080) would automatically be directed to a traditional Social Security account, but, at the employee's discretion, all or part of the Social Security Discretionary Balance = $4,080 might be directed instead to a Private Accounts.

3.4.2. Discretionary balance ratios

A participant's discretionary private savings and investments outside the Social Security system are not supported by the Social Security Discretionary Balance, but are financed by a *Private Discretionary Balance* (abbreviated, PDB). The employee's *Total Discretionary Balance* (abbreviated, TDB), therefore, is simply the sum: TDB = SSDB + PDB. The *Social Security Discretionary Balance Ratio*, SSDB/TDB, and the *Private Discretionary Balance Ratio*, PDB/TDB are obtained by algebraic transformation.

The Social Security Discretionary Balance Ratio (SSDB/TDB) and Private Discretionary Balance Ratio (PDB/TDB) are complimentary; that is (SSDB/TDB) + (PDB/TDB) = 1. Either ratio may be viewed as a measure of a participant's propensity (or ability) to make systematic contributions to retirement savings and investment accounts held outside the Social Security system. In the case of individuals who save nothing for retirement except their periodic FICA contributions, the Private Discretionary Balance Ratios (PDB/TDB) are equal to zero and their Social Security Discretionary Balance Ratios (SSDB/TDB) are equal to 1. For higher savings individuals, by contrast, their Private Discretionary Balance Ratios (PDB/TDB) >0 and, consequently, their Social Security Discretionary Balance Ratios (SSDB/TDB) <1. A participant whose Social Security Discretionary Balance Ratio (SSDB/TDB), is 0.10 is not necessarily a more affluent individual than another whose discretionary

balance ratio is, say, 0.25, 0.50, 0.75, or 0.90, but, for whatever reason (i.e., intrinsic wealth, good savings habits, or a generous defined contribution pension plan), clearly saves more.

While the Private Discretionary Balance Ratio (PDB/TDB) may be a more intuitive representation of a participant's propensity to save outside the Social Security system than the Social Security Discretionary Balance Ratio (SSDB/TDB), the latter seems to the authors to be a more intuitive representation for use in explaining the implications of Private Accounts on total portfolio risk-return tradeoffs for high, moderate, and low savings partic- ipants, respectively. In the figures below, we derive risk-return tradeoff implications for participants whose Social Security Discretionary Balance Ratios (SSDB/TDB) vary from 0.10, representing the highest savings participants considered in the experiment, to 0.90, representing those with the lowest propensity to save considered in the experiment. The risk-return tradeoff implications of private accounts for even lower savings individuals are also demonstrated, however.

Data from the Retirement and Health Survey (see Moore and Mitchell (2000), pp. 74–76) shows that when the Social Security Wealth (the present value of future Social Security benefits) is included in households' total assets, those in the lowest two quintiles of the wealth distribution do not own meaningful financial wealth and those in the next quintal of the distribution own only very modest amounts of financial wealth. We demonstrate risk- return tradeoff implications of Private Accounts for individuals in this lowest possible savings class by showing that a Privatization program would have already converged on, in effect, a worst case scenario by the time the Social Security Discretionary Balance Ratio (SSDB/TDB) reaches 0.90.

Returning to the previous example, if the Social Security Discretionary Balance Ratio (SSDB/TDB) = 10% for a participant who earned \$102,000 in 2008, then Social Security Discretionary Balance (SDB) = \$4,080, Total Discretionary Balance (TDB) = \$4,080/ 0.10 = \$40,800, and Private Discretionary Balance (PDB) = \$40,800-\$4,080 = \$36,720. This individual, therefore, would have contributed his or her Private Discretionary Balance (PDB) = \$40,800 to \$4,080 = \$36,720 to private accounts outside the Social Security system in 2008.

3.5. Simplified private accounts options

When selecting investments outside the Social Security system, an investor-participant is free to pick any feasible combination of risky assets–including, but not limited to, efficiently diversified portfolios represented by points on the efficient frontier in Fig. 1. The options available for Private Accounts investments, by contrast, are more restricted.[8] To facilitate exposition and analysis, we consider only the following options in the experiment:

- *Option 1:* Opt-out of Private Accounts: Leave 100% of the Social Security Discre- tionary Balance in a traditional Social Security account–which is tantamount to investing 100% of the Social Security Discretionary Balance in a quasi-riskless asset whose nominal holding period return, R_f, is represented by a proxy of just 3% in Table 1 that follows. This is roughly equivalent to assuming that the real rate of return on the traditional Social Security balance will be zero.[9]

Table 1   Discretionary balance ratios, private accounts investment options, nominal rates of return, and key to figures and tables

SDB/TDB investment ratio			10%	25%	50%	75%	90%
Revised frontier shown in figure			2	3	4	5	6
SSDB investment options	Expected return	Standard deviation	Curve no.	Curve no.	Curve no.	Curve No.	Curve No.
Opt-out							
Invest in quasi-riskless asset	3.00%	0.00%	1	1	1	1	1
Opt-in							
Invest is a long-term Treasury fund	14.05%	10.30%	2	2	2	2	2
Invest is a 50%–50% combination	14.64%	10.66%	3	3	3	3	3
Invest in a S&P 500 Stock Index Fund	15.23%	15.57%	4	4	4	4	4

- **Option 2:** Opt-in and invest 100% of the Social Security Discretionary Balance in a long-term treasury securities fund–represented by Point D in Fig. 1.

- **Option 3:** Opt-in and invest 50% of the Social Security Discretionary Balance in a long-term treasury fund and 50% in an S&P 500 stock index fund.

- **Option 4:** Opt-in and invest 100% of the Social Security Discretionary Balance in an S&P 500 stock index fund–represented by Point E in Fig. 1.

The coordinates of a point representing the mean and standard deviation for Option 3 were not plotted in Fig. 1 to avoid clutter. A key to the experimental design, the location of its exhibits, the options considered, and option summary statistics is provided by Table 1. The four options for investing Social Security Discretionary Balances considered in this paper, as outlined above, are represented in the table, where their nominal historical rates of return, standard deviations, and key to figures that represent them are also shown.

3.6. Diversification logic

Disregarding the proposed offsets to traditional accounts,[10] suppose that the nominal rate of return on allocations to traditional Social Security benefit accounts is set at 3%, which, assuming an average inflation rate of 3%, is tantamount to a 0% real rate of return (i.e., net of inflation) on this quasi-riskless asset. Additionally, suppose that, in effect, that investor-participants harbor financial expectations based on the security market experience for our sampling period, and, accordingly, that each optimizing individual invests his or her Private Discretionary Balance (PDB = TDB − SSDB) in that portfolio represented by a point on the efficient frontier shown in Fig. 1 that satisfies his or her investment objectives and attitudes towards risk. Selecting a portfolio represented by a point of an efficient frontier for the purpose of allocating the Social Security Discretionary Balance affects not only the Social Security Discretionary Balance investment risk-return tradeoff, but the risk-return tradeoff on a total portfolio (including assets and accounts both inside and outside the Social Security system) as well.

When choosing an efficient portfolio for the purpose of allocating one's Social Security Discretionary Balance, therefore, an optimizing investor-participant will consider the risk

reducing diversification benefits afforded by current period contributions to a traditional Social Security account that we treat as a quasi-riskless asset, and also the risk reducing or risk enhancing effects resulting from Social Security Discretionary Balance allocations–depending on which Private Accounts option the participant selects.

Current contributions to a participant's total retirement portfolio include shares of a unique portfolio obtained by investing a Social Security Discretionary Balance, shares of quasi-riskless asset obtained by mandatory allocation of current period FICA taxes to a traditional Social Security account, and the investment of the Social Security Discretionary Balance according to whichever Private Accounts option is selected. The rate of return and standard deviation on a total portfolio, whose relative weights are determined by the Social Security Discretionary Balance Ratio (SSDB/TDB), are obtained using numerical methods. For any Social Security Discretionary Balance Ratio (SSDB/TDB) and Private Accounts option considered, therefore, each point on the efficient frontier shown in Fig. 1 corresponds to a unique point on a different (locally optimal) frontier that we call a revised frontier; points along each revised frontier illustrated in subsequent figures are also obtain by numerical methods available from the authors on request. When contrasting revised frontiers associated with the alternative Private Accounts options, we should prefer that revised frontier–if there is one–that offers the best risk-return tradeoffs.

In the case where the opt-out option is selected, for example, 100% of the Social Security Discretionary Balance, plus an amount equal to 12.4% × Wage Base less the Social Security Discretionary Balance, would be allocated to a traditional Social Security account, and the Private Discretionary Balance would be invested in some efficient portfolio on the efficient frontier in Fig. 1. But in which portfolio? As explained by Sharpe (1964), and clarified by many others since, the risk reducing diversification benefits that result from introducing a riskless asset to a portfolio selection analysis, such as that illustrated by Fig. 1, may radically alter the feasible region and its efficient boundary.[11] It follows, therefore, that an investor-participant's portfolio choice in Fig. 1 may be influenced by both the risk reducing benefits provided by a traditional Social Security account, and by the opportunities afforded by Private Accounts. It is also possible, however, that the risk-return tradeoff opportunities available for investing Private Discretionary Balances are sufficiently better than the best that can be obtained by investing Social Security Discretionary Balances in a Private Accounts, that the investor-participant would be better off investing 100% of the Social Security Discretionary Balance in a traditional Social Security account (quasi-riskless asset), while exposing the Private Discretionary Balance to somewhat greater risk than he or she would otherwise do.

4. Empirical results

It will be seen from the discussions and illustrations that follow that, with just one minor exception in Fig. 2, the incremental risk required to achieve any preselected feasible target rate of return is higher for any opt-in option than the opt-out option, and that the differences increase as the Social Security Discretionary Balance Ratio (SSDB/TDB) increases from 0.10 to 0.90. The empirical results imply that the risk associated with membership in what
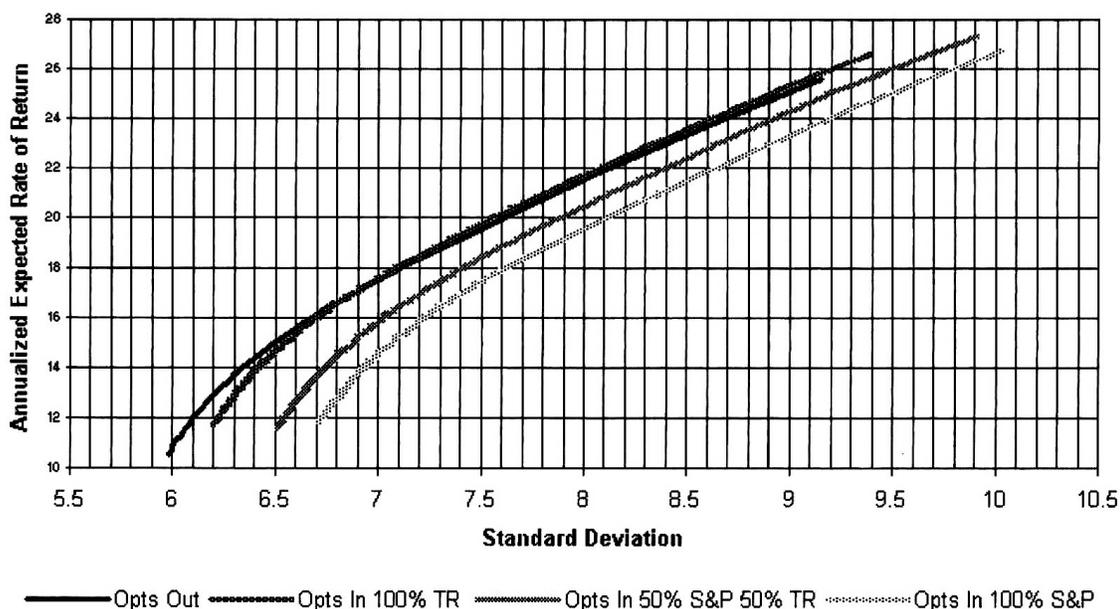
Fig. 2. Social Security Private Account: 10% of total periodic investment.

has been loosely referred to as an "ownership society" is proportionately higher for those who, by virtue of limited savings and investments outside the Social Security system, can least afford it.

4.1. Case of participants with high propensity to save for retirement

Total retirement portfolio revised frontiers are plotted in Fig. 2 for high savings individuals whose Social Security Discretionary Balance Ratio (SSDB/TDB) is 0.10. The efficient frontier shown in Fig. 1, representing investments outside the Social Security system, is not reproduced in Fig. 2 (or in subsequent figures) to avoid cluttering up. The rates of return and risks associated with selected points along that efficient frontier shown in Fig. 1, however, are reported in Columns 1 and 2, respectively, of Table 2, followed in Columns 3, 4, 5, and 6 by the risks corresponding points along the revised frontiers shown in Fig. 2.

The revised frontiers in Fig. 2 are identified by font styles and curve labels that appear at the bottom of the figure. As in Fig. 1, the vertical and horizontal coordinates of any point on any curve represent total portfolio annualize expected return and risk respectively. As noted earlier, the 3% offset that would apply to any opt-in Private Accounts option is disregarded in these calculations. Thus the results shown in the figure are more favorable to Private Accounts in general, and the counter proposition in particular, than would be the case if the 3% offset rule was taken into account. We do not formally study the impact of this offset rule in this paper, but we do show below that its affect on risk-return tradeoffs is intuitively obvious.

Each revised frontier shown in the figure consists of a locus of points representing optimizing total portfolio risk-return combinations for a particular Private Accounts option. Every point on each revised efficient frontier, therefore, represents an optimizing total

Table 2   Social Security Private Account: 10% of total periodic investment*

Target return %	Market risk %	Opt-out risk %	100% LT Treasury %	50% LTTR 50% S&P %	100% S&P %
20.00	NA	NA	NA	7.95	8.13
19.50	7.93	7.55	7.54	7.75	NA
19.00	7.77	NA	7.36	NA	7.93
18.50	NA	NA	NA	NA	NA
18.00	7.64	7.13	7.10	7.47	7.66
17.50	7.44	NA	7.00	7.37	7.56
17.00	7.37	6.99	6.92	7.21	7.47
16.50	7.26	6.87	6.80	7.16	7.35
16.00	7.21	6.70	6.71	7.06	7.25
15.50	7.13	6.63	6.63	6.98	7.17
15.00	7.03	6.54	6.57	6.88	7.08
14.50	6.96	6.45	6.48	6.82	7.00
14.00	6.90	6.35	6.42	6.75	6.94
13.50	6.84	6.28	6.37	6.69	6.88
13.00	6.78	6.22	6.31	6.63	6.83
12.50	6.77	6.16	6.27	6.63	6.79
12.00	6.70	6.10	6.24	6.55	6.75
11.50	6.66	6.09	6.20	6.51	6.71
11.00	6.65	6.02	NA	NA	NA

* Cell with no precise solutions are marked NA.

portfolio risk-return tradeoff, for a particular target rate of return and Private Accounts option combination.[11]

We see in Fig. 2, and subsequent figures, that curves representing Private Accounts Options 3 and 4 (i.e., opt-in and invest 50% in LT Treasury and 50% in the S&P 500 or opt-in and invest 100% in the S&P 500, respectively) offer the participant no globally optimal alternatives. For this case, representing high savings individuals, on the other hand, curves representing Private Accounts Options 1 and 2 (i.e., opt-out or opt-in and invest 100% in LT Treasury, respectively) in the figure cross at a point, which we see by contrasting Columns 3 and 4 in Table 2, corresponds to a risk-return tradeoff of 6.63%/15.5%.

For high savings individuals, therefore, the opt-out and LT Treasury Private Accounts options result in identical risk-return tradeoffs for an investor-participant whose total portfolio target rate of return happens to be 15.5%. As can seen from the figure or table, the opt-out option produces slightly better results for total portfolio target rates of return below 15.5% and nearly identical (though technically inferior) results for annualized target rates of return higher than 15.5%. The conclusion one reaches, therefore, is that over any range of target rates of return for which feasible solutions for the opt-out option exist, the total portfolio risk-return tradeoffs that result from opting out (i.e., selecting Option 1) are either globally optimal or nearly so. But what conclusion would be reached if one did not disregard traditional benefit account offsets?

Contrasting the data in Column 3 in Table 1 with the data in Columns 4, 5, and 6 we see that if the 3% traditional benefit account offset were formally taken into account, those ties that exist between Private Accounts Options 1 and 2, where target rates of return are above 15.5%, would be broken. Thus, if offsets were taken into account, the opt-out strategy would
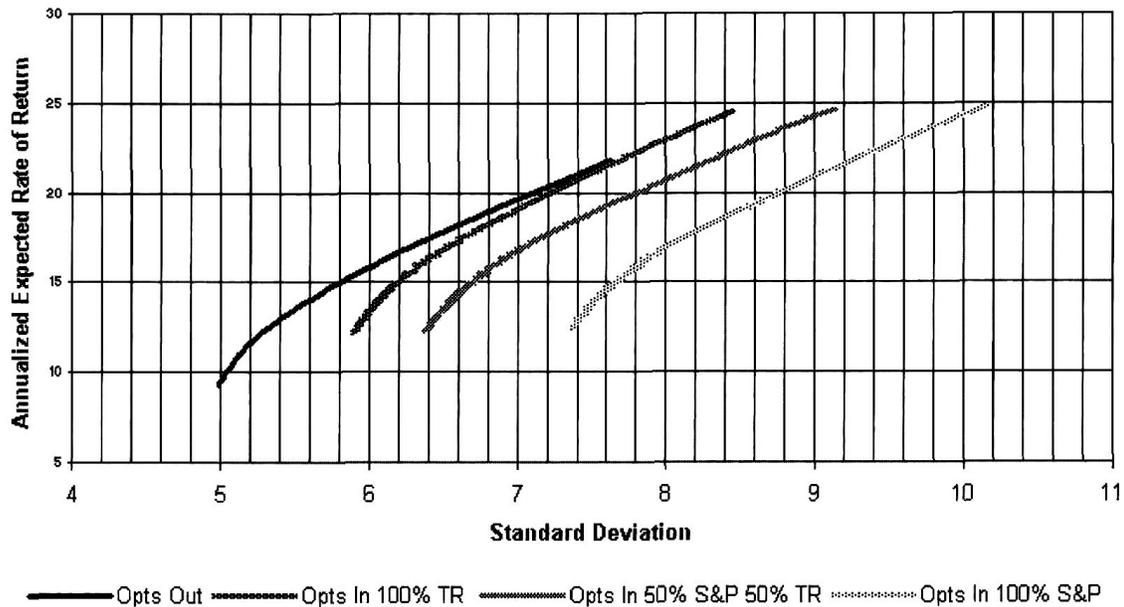
Fig. 3. Social Security Private Account: 25% of total periodic investment.

be the strategy of choice for participants with high propensities to save. The implications of the offset are intuitively obvious in this case, but may be less so in cases of investor-participants with lower propensities to save.

4.2. Cases of participants with lower propensities to save for retirement

Fig. 3 illustrates the case where the Social Security Balance Ratio (SDB/TDB) is 0.25. We see from the figure that for any total portfolio target rate of return at or below 21.84% the opt-out total portfolio solution is globally optimal and should be the clear choice of any optimizing participant. As there are no feasible opt-out solutions offering total portfolio rates of return beyond 21.84%, it appears that an occasional risk loving "high roller" might consider Private Accounts Option 2, which calls for opting in and investing 100% of the Social Security Discretionary Balance in a LT Treasury fund. This flirtation would not survive a brief review of Fig. 1 and Table 1, however.

As Gary Becker (2005) reminds us, "there is no free lunch." We see from Table 1 that the risk-return trade-off for investing 100% of the Social Security Discretionary Balance in a LT Treasury fund is 10.30%/14.05%. We see from Fig. 1, however, that point D, which represents this risk-return combination, is easily dominated by any efficiently diversified pure stock portfolio represented by any point the efficient frontier corresponding to a target expected rate of return of 14.05% or more, and that there is not a single feasible, pure stock, efficient portfolio whose annualized standard deviation is as high as 10.30%.

While solution points on the efficient frontier in Fig. 1 represent only efficiently diversified pure stock portfolios, it follows from a formal proof by Markowitz (1959, p. 103) that there should exist an efficient combination of at least one efficiently diversified pure stock portfolio (possibly many) and a LT Treasury fund that offers a superior risk-return tradeoff
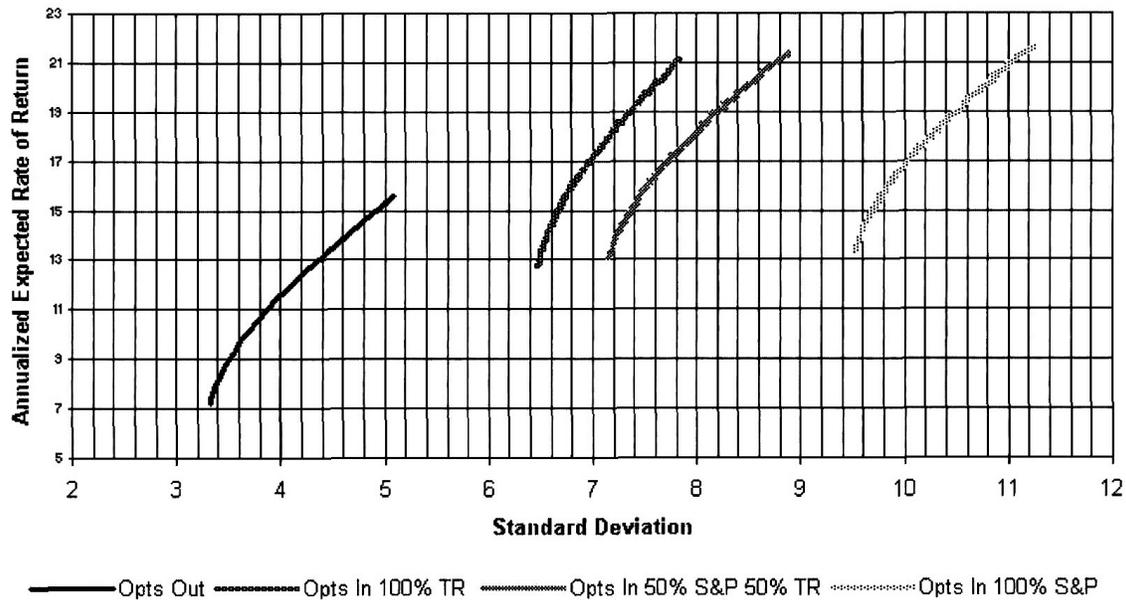
Fig. 4. Social Security Private Account: 50% of total periodic investment.

than any ad-hoc combination of the same stock portfolio and the same LT Treasury fund–except by pure accident.

As a practical matter, the scope of the experiment had to be limited to pure stock efficient portfolios but we can draw valid inferences about various cases not explicitly in the experiment on the basis of similarity or by exploiting well known properties of the model. As investor-participants, for example, are subject to few if any restrictions in their Private Discretionary Balance allocations, superior investment opportunities–subject to fewer constraints–are likely to exist outside the Social Security system than inside. The magnitude of the Social Security Discretionary Balance, on the other hand, and the Private Accounts options available for investing it, will be determined by a highly politicized legislative process that is not known for economic rationality, much less for the issuance of optimizing regulations.

The situation seems fairly clear-cut, therefore, for investor participants with high and moderate propensities to save, as represented by Social Security Ratios (SSDB/TDB) less than or equal to 0.25. Should we not expect, however, that investor-participants with lower propensities to save and invest outside the Social Security system should be enticed by the opportunity to become card-carrying members of an "ownership society"? Not necessarily.

The case against Private Accounts developed so far in this paper is significantly enhanced in Fig. 4, where the choices available to participants with a Social Security Discretionary Balance Ratio (SSDB/TDB) = 0.50 are illustrated. We note in Table 1 that the expected rate of return on the S&P 500 Stock Index for the period covered by our sample is 15.3%. Fig. 4, by contrast, shows no feasible opt-out opportunities offering total portfolio expected returns higher than 15.7%, and thus no way to beat the market, as measured by the rate of return on the S&P 500 stock index, by very much.

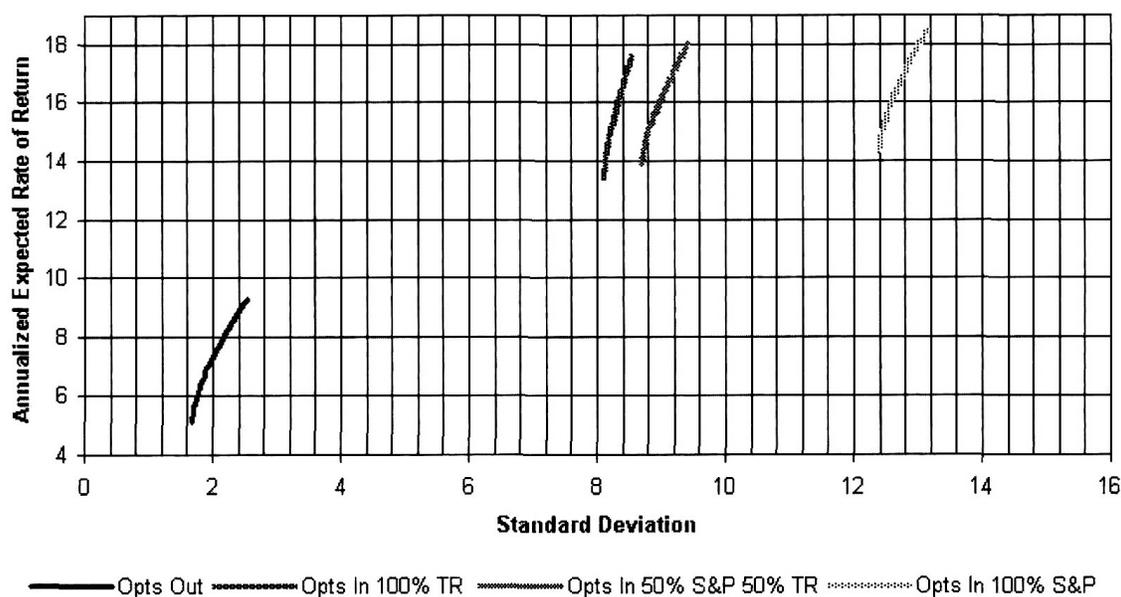Each of the opt-in options, on the other hand, show total portfolio expected return

Fig. 5. Social Security Private Account: 75% of total periodic investment.

opportunities that range from a minimum of approximately 13% to approximately 21%. In the range from approximately 13% to 15.57%, where feasible opportunities exist for both the op-out Private Accounts option and each of the op-in options, the opt-out options are globally optimal–offering minimizing risk levels that vary from approximately 30% to 52% less than any opt-in alternatives promising like returns.

In the range of opt-in total portfolio target rates of return higher than 15.7%, we see from the figure that each of the opt-in revised frontiers are quite steep–which implies that incremental risks are not much affected by diversification. These observations beg the question: Is it the purpose of the privatization proponents to suggest to participants with such limited propensities to save and invest for retirement outside the Social Security system that should act in a spirit of unbridled risk neutrality when making Social Security Discretionary Balance allocation decisions?

Figs. 5 and 6 illustrate cases where the Social Security Discretionary Balance Ratios (SSDB/TDB) are 0.75 and 0.90, respectively. We see from Fig. 5, representing the case where the Social Security Discretionary Balance Ratio (SSDB/TDB) is 0.75, that the opt-out revised frontier offers no total portfolio expected returns beyond approximately 9%; in Fig. 6, representing the case where the Social Security Discretionary Balance Ratio (SSDB/TDB) is 0.90, the maximum opt-out return falls to approximately 5.5%. Neither figure, on the other hand, shows a single opt-in opportunity offering less than a 13% expected rate of return.

A naive reading of these results might suggest that a justification for investing is Private Accounts has finally been made, but such a first impression would not survive more careful analysis of Figs. 5 and 6. We see from the figures that for investor participants with low propensities to save, as represented by Social Security Discretionary Balance Ratios (SSDB/TDB) equal to or greater than 0.75, a quantum jump in risk–relative to the risk associated with the opt-out solution offering the highest return–is required even if the most "conser-
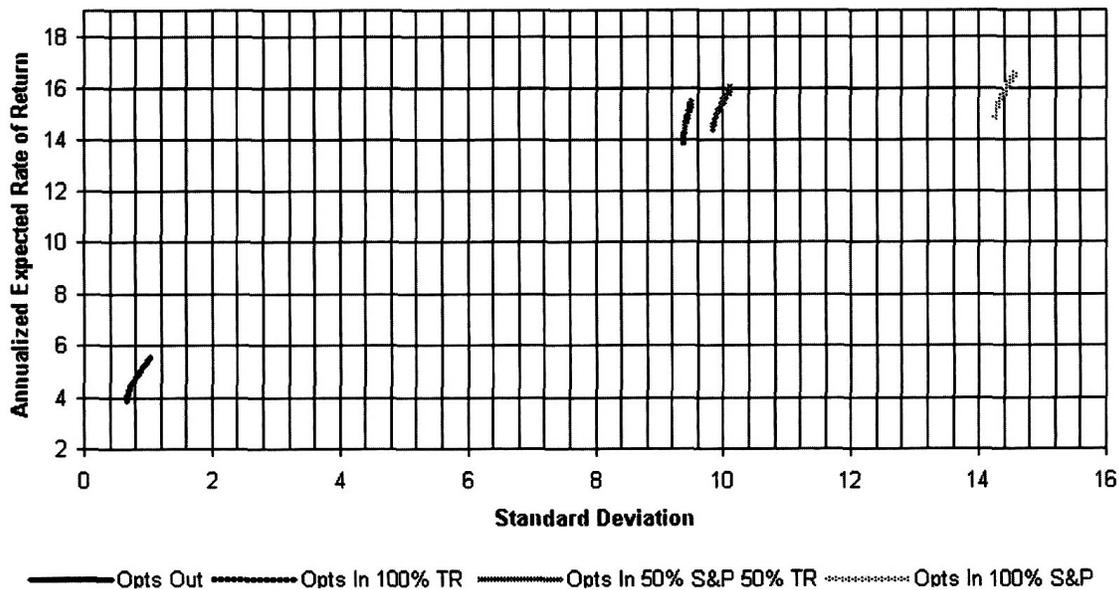
Fig. 6. Social Security Private Account: 90% of total periodic investment.

vative" opt-in solution available is selected, and that the opt-in risk-return tradeoff opportunities are converging.

A review of these figures begs a question slightly different than the one asked above: Is it the purpose of privatization proponents to suggest that investor-participants with such limited propensities to save or invest for retirement outside the Social Security system, should ante as much as 62% of their FICA wage taxes to engage in a variant form of crap-shoot?

5. Conclusions

To the extent that the economic consequences of privatization have been seriously considered, the debate has centered on the long-term solvency of the Social Security system, rather than on the likely financial consequences to individual participants of investing in Private Accounts. This paper shifts the focus: The financial consequence of Private Accounts for individual participants are analyzed in an idealized market framework, carefully crafted to afford Private Accounts (and a counter proposition) every advantage.

Using benchmarks derived on the basis of the mean-standard deviation efficiency criteria, and data representing a decade of sustained economic and securities market growth, purposely chosen to minimize the likelihood of falsely rejecting the counter proposition that:

The introduction and funding of Social Security Private Accounts will result in improved risk-return tradeoffs for efficiently diversified retirement portfolios,

no empirical support is found for this proposition. Rejection of the counter proposition under a best case scenario implies the following: That it would be rejected under any more realistic

set of security market assumptions, that Private Accounts would, in general, offer participants no advantage, and thus that the Privatization proposal should not be reintroduced.

Our empirical results show, with only one minor exception in Fig. 2, that any target total portfolio rate of return that can be achieved by diverting a portion of one's FICA tax to a Private Account can be achieved at a lower risk by exploiting the total portfolio diversification benefits afforded by traditional benefit accounts. The empirical results also show that the total portfolio incremental risk resulting from investing in Private Accounts is inversely related to individual propensities to save and invest for retirement by contributing to investment accounts outside the Social Security system, and is proportionately higher for those with low propensities to save than for those with higher propensities to save. In the case of investor-participants with low propensities to save in particular, even the most conservative Private Account investment strategy will result in a quantum jump in total portfolio risk. The 2008 financial meltdown would clearly have exacerbated the ex poste implications of these results.

Of course not every investor-participant is a perfectly calculating, portfolio optimizer. Nevertheless, the investment and risk reducing diversification opportunities, in the sense first explained by Markowitz (1952), available outside the Social Security system are superior to those that would be available under any one, or combination, of the Private Account investment options envisaged by recent proposals. In general, therefore, the opportunities to diversify, and, relatedly, potential rewards for bearing risk, on accounts held outside the Social Security system should always be better than what Social Security Private Accounts can offer. Traditional Social Security accounts, by contrast, offer participants annuitization at lower (implicit insurance) costs than private insurers can, by eliminating self-selection biases that influence individual decisions whether or not to annuitize, and thus spreading the insurance risk over a larger and more diverse population of annuitants.

Low saving participants, who systematically contribute little or nothing to personal savings or investment accounts outside the Social Security system, on the other hand, cannot effectively exploit these general market opportunities, and thus cannot diversify away investment risks introduce by opting-in to Private Accounts. In the case of investor-participants with moderate to high propensities to save, on the other hand, any potential increase in total portfolio expected returns that might result from investing in Private Accounts can be duplicated or exceeded at lower risk by exploiting the risk reducing benefits of investing Social Security Discretionary Balances in traditional benefit accounts, that we liken to a riskless asset, and compensating by investing the Private Discretionary Balances somewhat more aggressively.

Even when traditional benefit account offsets are disregarded, our experimental results show that investor-participants with moderate to high propensities to save would have no incentive to opt-in; they would have less incentive still to op-in if these mandated offsets were taken into account. But what are the implications of Private Accounts for participants with little or no ability to save for retirement outside the Social Security system? Would Private Accounts not offer such low saving participants an opportunity to become card-carrying members of an ownership society?

According to *Retirement and Health Survey* data cited above, when the present value of future Social Security benefits is included in households' total assets those in the lowest two

quintiles of the wealth distribution do not own meaningful financial wealth, and those in the next quintal of the distribution own only very modest amounts of financial wealth. Our empirical results suggest, therefore, that the financial risk resulting from investment in Private Accounts would be highest for those in the lowest three quintiles of the wealth distribution.

While the empirical results reported in this paper show the risks borne by members of such low savings classes of participants by opting-in to a Privatization plan would be unwise and imprudent even in the absence of the traditional account offsets that are mandated by the plan, there are undoubtedly those who would be enticed by the false premise that by so doing they would render themselves members of an "ownership class." But if so, at what cost?

The introduction of Private Accounts would likely encourage inexperienced participants, oblivious to the deleterious affects of investment risk, to search for levels of return that more seasoned investors would not pursue, and, thereby, encourage reckless risk-taking behavior by those who can least afford it. More generally, the introduction of Private Accounts under Social Security would stand in open violation to the standards of pension asset management prudence established by ERISA.

Notes

1. The late Senator Barry Goldwater, for example, introduced a privatization proposal in his 1964 presidential campaign. More recently, Senator McCain, in February 2008 interview, voiced support the Bush proposal (see Bob Davis, WSJ, March 3, 2008, p. A14), and when further quarried on the subject, distanced himself from a "compromise" proposal suggested by Congressman Rahm Emanuel (see Congressman Rahm Emanuel, WSJ, September 2007, p. A17).

2. The options offered under the proposal, which are the same as under the Thrift Savings Plan (TSP) for federal workers, would include three stock mutual fund alternatives, a corporate bond fund, a Treasury bond fund, or any combination thereof.

3. According to ERISA's Prudence Rule (93rd Congress, Second Session, *Employee Retirement Income Security Act of 1974*): "The prudence of an investment decision should not be judged without regard to the role that the proposed investment or investment course of action plays in the overall plan portfolio" (*BNA Pension Reporter*, No. 245, June 25, 1979).

4. Hubbard (1985), for example, argued that "there is no market for the purchase or sale of anticipated benefits and no market for borrowing . . . against them." Clearly, the establishment of Private Accounts, financed by funds that would otherwise be directed to a traditional accounts, is tantamount to the creation of such a market.

5. The options actually offered under the present proposal, which are the same as under the Thrift Savings Plan (TSP) for federal workers, would include three stock mutual fund alternatives, a corporate bond fund, a Treasury bond fund, or any combination thereof. These specific options may be changed by future administrations, Congress, or at the behest of special interest groups seeking to influence both. Under the privatization plan promoted by the Cato Institute, for example, "workers would have

the option of staying in the current system or instead paying into a private stock and bond account managed by a professional, qualified investment company" (see, Crane, 1997, p. 6)].

6. Let $E(R_A)$ and $E(R_B)$ be the expected returns on investment alternatives A and B, respectively, and $SD(R_A)$ and $SD(R_B)$ represent their corresponding investment risk levels. Then, according to these mean-standard deviation efficiency criteria, investment option A is said to dominate investment option B if and only if $\{E(R_A) \geq E(R_B)$ and $SD(R_A) < SD(R_B)\}$ or $\{E(R_A) > E(R_B)$ and $SD(R_A) \leq SD(R_B)\}$.

7. The monthly portfolio means and standard deviations were converted to annualized equivalents, using methods described in Lo and MacKinlay (1990).

8. For those who opt-in, as previously noted, the investment options include three stock mutual funds, a corporate bond fund, and a Treasury bond fund.

9. This rate is clearly quite low, and intentionally so. We choose such a low rate to serve as a proxy for a quasi-riskless rate of return to give every advantage to an opt-in strategy under the proposal.

10. That is, "every dollar diverted . . . plus interest at a rate of 3% after inflation" will be deducted from guaranteed Social Security payments (Schneider, 2006, p. 13).

11. Traditional Social Security income offsets are included in the privatization proposal. These offsets, that affect only those who opt-in, are disregarded in Fig. 2 and in the discussion that follows, but are taken up under Conclusions–where it is shown that the implications of an offset are intuitively obvious.

References

Becker, G. (2005). A political case for social security reform. *The Wall Street Journal Editorial Page,* February 15, 2005, p. A18.

BNA Pension Reporter, No. 245, June 25, 1979, the Bureau of National Affairs, Inc., Washington, DC, 20037, pages unnumbered.

Bush, G. W. (2005). *The White House, Office of the Press Secretary, Press Conference of the President* (available at http://www.whitehouse.gov/news/releases/2005/04/20050428–9.html).

Crane, E. H. (1997). *A Case for Privatizing America's Social Security system.* Address by Edward H. Crane, President of Cato Institute, before the S.O.O. Retraite Sante, Paris France (available at http://www.social security.org/pubs/testimony/art-22.html).

Davis, B. (2008). McCains's economy platform: Big tax cuts, caveats. *The Wall Street Journal,* Monday, March 3, pp. A1 and A14.

Emanuel, R. (2007). Supplementing Social Security. The *Wall Street Journal Commentary Page,* September 13, p. A17.

Fraser, S. P., Jennings, W. W., & King, D. R. (2000). Strategic asset allocation for individual investors: the impact of the present value of Social Security benefits. *Financial Services Review 9,* 295–326.

Hubbard, G. R. (1985). Personal taxation, pension wealth, and portfolio composition. *The Review of Economics and Statistics, 67,* 53–60.

Koopmans, T. C. (1947). Measurement without theory. *The Review of Economics and Statistics, 29,* 161–171.

Lo, A., & MacKinlay, C. (1990). An econometric analysis of nonsynchronous-trading. *Journal of Econometrics, 45,* 181–212.

Markowitz, H. (1952). Portfolio selection. *Journal of Finance, 12,* 77–91.

Markowitz, H. (1959). *Portfolio Selection.* New Haven, CT: Yale University Press.

Merton, R. C. (1969). Lifetime portfolio selection under uncertainty: The continuous-time case. *The Review of Economics and Statistics, 51,* 247–257.

Moore, J., & Mitchell, O. S. (2000). Projected retirement wealth and saving adequacy. In O. S. Mitchell, B. Hammond, & A. Rappaport (Eds.), *Forecasting Retirement Needs and Retirement Wealth* (pp. 68–94). Philadelphia, PA: University of Pennsylvania Press.

Pozen, R. C. (2005). A win-win proposition. *Wall Street Journal Editorial Page* (available at http://www.opinion journal.com/editorial/feature.html?id=110006639).

Reichenstein, W. (1998). Calculating a family's asset mix. *Financial Services Review, 7,* 197–205.

Samuelson, P. A. (1969). Lifetime portfolio selection by dynamic stochastic programming. *The Review of Economics and Statistics, 51,* 239–246.

Schneider, J. (2006). Security for Seniors: Saving Social Security (available at www.votejan.com/SavingSocial Security.pdf).

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance, 19,* 425–442.