YIKES! HOW TO THINK ABOUT RISK?

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INSIDE

Introduction

The same issue keeps reappearing. How to deal with the risk associated with equity investments when evaluating the financial health of retirement systems? Some experts argue that retirement plans holding equities can make smaller funding contributions than those invested primarily in bonds. After all, stocks yield 7 percent, after inflation, and bonds only 3 percent. Nonsense, say others. The higher expected returns on equities reflect their greater risk. Any serious financial evaluation of retirement arrangements must "risk-adjust" these returns. After accounting for risk, the contribution needed today to fund future pension obligations is the same regardless of whether the fund is invested in equities or bonds.

Is it possible to reconcile these two views? How should individuals, governments, and employers account for the expected additional returns from equity investment in pension funds? How should they account for the additional risk? Finally, and perhaps most importantly, how does this relate to the debate about creating private accounts with equity investments for Social Security?

To sort out these difficult questions, this brief does three things. First, it describes how equities have performed over the last 75 years. Second, it explains how economists, accountants, and actuaries handle the high returns/high risks associated with equities in the real world. Finally, it explores the implications of the risk discussion for evaluating Social Security reform proposals.

The conclusion is that the treatment of the high returns/high risks associated with equity investment depends on the extent to which the entity can manage the risk and the purpose of the calculation. In the case of Social Security reform proposals, evaluations that focus solely on the expected return to equities, without adjusting for risk, overstate the contribution of private accounts to retirement income security.

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The Nature of the Beast: 75-Year Equity Performance

That stocks have had a higher average return over the last 75 years is indisputable. As shown in Table 1, nominal stock returns over the period 1926-2002 were 10.2 percent compared to 5.4 percent for intermediate government bonds. After adjusting for inflation, stocks returned 7.2 percent and government bonds 2.4 percent.

Table 1. Stocks Have Higher Long-Run Returns, but Carry Greater Risks

Annual Returns on Financial Instruments and Inflation Rate, 1926-2002

Financial Instrument	Rate of Return	Standard Deviation
Equities[a]	10.2	20.5
Long-term corporate bonds	5.9	8.7
Intermediate government bonds	5.4	5.8
U.S. Treasury bills	3.8	3.2
Inflation	3.0	4.4

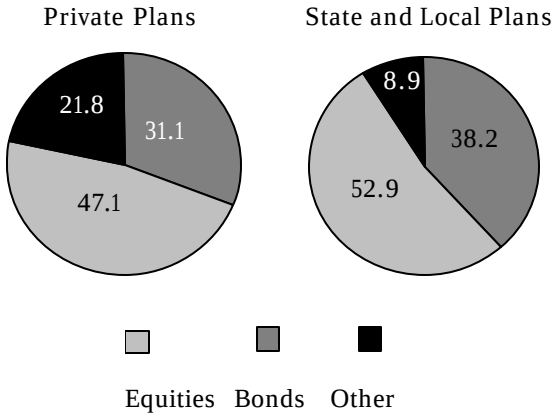
Source: Ibbotson Associates, Inc. (2003). Stocks, Bonds, Bills, and Inflation®. 2003 Yearbook. Based on copyrighted works by Ibbotson and Sinquefield. All rights reserved. Used with permission.

a. Stocks refer to the returns on large company stocks. Over the same period, the return and standard deviation on small company stocks was somewhat higher: a 12.5 percent return with a standard deviation of 33.2 percent.

Looking at averages, however, does not tell the whole story. The variability, as measured by the standard deviation, was much higher for stocks than bonds. This means that while stocks can be expected to outperform bonds on average, the performance of the stock market is very uncertain. The historical data show that for any given 10-year period, investors have a 25 percent chance of realizing lower returns from a portfolio of Standard and Poor's stocks than from a portfolio of government bonds.[1] Even during the post-World War II period, which has been a tremendous boom for stocks, stocks returned no more than government bonds for long periods of time. For example, between 1966 and 1981, real stock returns averaged -0.4 percent compared to -0.2 on short-term government securities.[2]

Figure 1. Employer-sponsored Pension Plans Invest in a Mix of Assets

Percent Composition of Assets, 2004



Source: Board of Governors of the Federal Reserve (2004). "Flow of Funds Accounts of the United States: Flows and Outstandings, Third Quarter." Chart L.119.b and L.120. Federal Reserve Statistical Release.

Because stocks involve the potential for much greater losses than bonds, investors demand an "equity premium" to hold stocks. If stocks did not produce a higher expected return, an investor choosing between a low-risk bond portfolio and a high-risk stock portfolio would always choose bonds. In short, the higher expected returns on stocks reflect the greater risk associated with stock investment.[3]

Given the risk and return characteristics of stocks and bonds, how do sponsors of defined benefit pension plans fund their future liabilities? As shown in Figure 1, both private sector employers and state and local governments use a mix of assets that includes a large share of equities.[4]

Valuation of Pension Plans: The Real World

How do practitioners treat equity investments when they evaluate pension plans in the real world?[5] In practice, these valuations are used for two purposes: to determine funding contributions and to report on the condition of the plan in the sponsor's financial statements. In describing the landscape, it is helpful to remember that the United States has three separate sponsors of funded defined benefit plans — private sector employers, state and local governments, and the federal government as manager of the Railroad Retirement System.[6]

Private Plans

The Employee Retirement Income Security Act of 1974 (ERISA) is the basic law governing the funding of private sector employer plans. In determining the funding contribution, the legislation allows sponsors to discount future obligations using a "reasonable" discount rate that reflects the asset mix in the pension fund.[7] ERISA reflects the traditional approach used by actuaries. Actuaries are in the business of producing "best-guess" estimates of factors that involve a significant degree of uncertainty, such as mortality rates, termination rates, real wage growth, inflation, and asset returns. Since a portfolio of stocks and bonds has a higher "best guess" expected return than a bonds-only portfolio, the actuaries discount liabilities by the higher rate. They do not account for the risk in equity investments, nor do they account for the risk in the other variables used in the plan valuation. If the cost estimate proves too low, they revise their calculations, and the sponsor has to increase its contributions to the plan. The actuary's valuation is simply a tool for establishing a funding schedule assuring the plan a sufficient long-term flow of resources.

Assuming higher returns for equities in pension plans produces a "best guess" estimate, but.....

In the 1980s, a rash of bankruptcies and plan failures showed policymakers that many sponsors did not have the wherewithal to increase contributions when the higher expected return on equities did not pan out. These failures placed enormous financial pressure on the Pension Benefit Guarantee Corporation (PBGC), the agency established to insure benefits of insolvent plans.[8] To protect the PBGC and the community of pension sponsors that funds the agency, the government enacted legislation in 1987. That legislation requires firms to calculate the present value of their "current liabilities,"a proxy for the benefits insured by the PBGC, and do so using a low-risk discount rate (see Table 2).[9] (The big controversy these days is which bond rate is most appropriate!)[10] The unfunded liability calculated in this fashion provides the basis for an alternate minimum funding requirement. In the current environment, the minimum contributions mandated by the new "current liability" approach are generally greater than those required under the actuarial "continuing liability" funding schedules sanctioned by ERISA.

For reporting the status of their plans in their financial statements, private plan sponsors must follow guidelines established by the accounting profession.[11] These accounting rules generally require the use of a low-risk rate to discount future benefit obligations when reporting the funding status of the plan. When estimating the current year's pension expense, however, sponsors can include in their calculations the expected return on pension fund assets. If the pension fund holds equities, this procedure lowers the sponsor's current pension expense and reflects the notion that investing in stocks reduces the cost of funding long-term obligations. Indeed, under current rules, a company that shifts its asset allocation from bonds to equities would report lower pension expense and higher operating profits.

Where does this complicated array of calculations leave us? Essentially different actors are making different calculations for different purposes.[12] Actuaries are in the business of determining funding rates. Their recognition of the higher expected returns associated with equities represents the best estimate of the future growth of the assets in hand and the ability of these assets to cover future liabilities. Financial economists and accountants are in the business of calculating liabilities. They see the required future benefit payments as a contractual bond-like obligation of the firm. As such, they require a bond-like interest rate to calculate the present value of future pension

Table 2. Pension Plans Use Different Discount Rates for Different Purposes

Average Discount Rates Used to Value Liabilities, 2003

Plan Type/Purpose	Discount Rate
Private Plans	
Actuarial Funding Schedules	8.10 %
"Current Liabilty" Funding Requirement	6.20 %
Reporting in Financial Accounting Statements	6.17 %
State and Local Plans	
Funding Schedules and Financial Reporting	8.03 %

Sources: Private Plans: Funding data from Watson Wyatt (2004). "Survey of Acturial Assumptions and Funding." Reporting data from Watson Wyatt (2004). "Accounting for Pensions and Other Post Retirment Benefits." State and Local Plans: Data from National Associaton of State Retirement Administrators (2004). "Public Fund Survey, FY 2003" (September).

payments. According to this approach, the asset composition of the pension fund is irrelevant in evaluating the solvency of a pension plan. Selling $100 worth of bonds and replacing them with $100 of stocks would have no effect on the funding status of the plan.[13] Thus, when reporting certain future obligations on their balance sheets, sponsors are required to use a low-risk discount rate. In a similar fashion, the PBGC uses a low-risk discount rate to evaluate its own contractual, bond-like exposure.

...accounting for risk is necessary for assurance that an employer can meet its obligations.

State and Local Pensions Plans

State and local plans are not required to follow the minimum funding practices defined in federal legislation. For both reporting and funding purposes, these plans are "guided" by rules set out by the Government Accounting Standards Board (GASB), and therefore are relatively free to choose the discount rate to estimate the present value of future benefits. In practice, some states use a low, relatively riskless rate as suggested by the GASB. Most, however, use rates consistent with the mix of assets in their pension funds.

Federal Government

The federal government has recently confronted the issue of equity investment in the context of the Railroad Retirement System. Although the system's actuary characterized the system's long-term stability as "questionable," Congress in 2001 raised benefits, reduced contributions, and sought to square the circle by authorizing the National Railroad Retirement Fund to invest in equities, as well as other non-traditional assets. The shift meant that government scoring agencies, such as the Office of Management and Budget (OMB) and the Congressional Budget Office (CBO), had to determine the appropriate treatment of expected higher returns on the new assets for projections of trust fund balances. In each case, the agency decided to ignore the higher expected returns on equity investments and project returns at the long-term Treasury rate. They, in effect, assumed that the additional return on stock was precisely offset by the cost of its additional risk. According to the OMB, "This will mean that assets with equal economic value as measured by market prices will be treated equivalently, avoiding the appearance that the budget could benefit if the Government bought private sector assets."[14]

The scoring agencies want to avoid a situation where the government could appear to raise money simply by issuing debt and buying stock with the proceeds. For example, assume the government issued $1 billion of debt for which it had to pay a real rate of 3 percent and invested the entire amount in the Standard & Poor's index, which historically has yielded 7 percent. If the scoring agencies used historical returns for forecasting, at the end of five years the stock would be projected to have a value of $1.4 billion, and the government debt with accumulated interest a value of $1.16 billion. This exercise suggests that the government raised $240 million in five years simply by issuing debt and buying stocks of equivalent value. Why stop there? Why not issue trillions and eliminate taxes? The answer is that such an approach neglects the risk in equity investment. Ignoring risk overstates the future resources available to the government, because it fails to take into account the cost of that risk to future taxpayers.

Implications for Social Security Reform Proposals

The question of how to account for equity investment also arises in the context of reporting the outcome of alternative Social Security reform proposals. Here the two government agencies that evaluate these proposals — the Congressional Budget Office and the Social Security Administration — take different approaches.

Federal budget agencies use risk-adjusted returns for equities in the Railroad Retirement Fund.

Both agencies have projected future benefits under "Model 2" proposed by the President's Commission to Strengthen Social Security, the leading private account proposal. The plan has two components. The first slows the growth of benefits by indexing future benefits to the growth of prices rather than wages. Because wages traditionally rise faster than prices, the share of a worker's pre-retirement income replaced by Social Security would decline steadily over time. This decline in replacement rates more than eliminates the entire 75-year deficit. The second component of Model 2 allows typical workers to put about 3 percent of their payroll tax in a private account and receive a smaller benefit from the Social Security system when they retire.[15] The key

question is the extent to which investments in private accounts can offset the benefit cuts from price indexing.

To calculate future benefits under Model 2, the CBO assumes that participants would invest their private-account portfolios as follows: 20 percent in Treasury bonds, 30 percent in corporate bonds, and 50 percent in stocks. The average real return for this portfolio is 5.2 percent. After projected administrative costs of 0.3 percent, the net expected real return is 4.9 percent. The agency then makes two different calculations to incorporate risk. The first assumes that the assets in the private account portion of the Social Security system earn a risk-adjusted return of 3 percent (3.3 percent assumed return on Treasury bonds less 0.3 percent administrative costs) rather than 4.9 percent. That is, the CBO subtracts the cost of the additional risk from the expected return. If private accounts earn only the bond rate, Model 2 produces a significant reduction in benefits as compared to current law (see Table 3).

Table 3. CBO Risk-Adjusted Returns for Model 2 Show Large Benefit Cuts

Percent Reduction from Scheduled Benefits for Average Earning Individual under Model 2

Year Turning Age 65	Risk-Adjusted Returns
2015	-7.2
2035	-23.7
2055	-37.7
2065	-45.2

Source: Congressional Budget Office (2004). "Long-Term Analysis of Plan 2 of the President's Commission to Strengthen Social Security." (July 21)

The second approach adopted by the CBO involves simulating a large number of future outcomes. This approach incorporates both the portfolio's higher risk and its higher expected return. The agency then reports the middle 80 percent of outcomes. When the Model 2 program is fully phased in, the CBO projects the middle 80 percent of payouts (combining the remaining traditional pension and payouts from individual accounts) to range from a third above to a third below the "expected" outcome. The advantage of the simulation approach is that it illustrates the extremely wide range of potential outcomes. The disadvantage is that it cannot incorporate this variance into a single figure to project future benefits.

The Social Security actuaries generally cost out Social Security reform proposals without explicitly addressing the issue of risk in portfolios that contain equities. To calculate future benefits for individuals under "Model 2", they project the combined benefits that participants will receive from Social Security and their private accounts using the expected returns on the assets in their portfolios. The results for the all-bond portfolio (see Table 4) are very close to those reported by the CBO in Table 3. The results using projected average returns for a portfolio with equities show very little reduction from benefits scheduled under current law, at least for the next half-century.

Whether the returns on private accounts are adjusted for risk makes an enormous difference when assessing the impact of alternative plans. Using the riskless rate to project future benefits makes the benefit cuts in "Model 2" of the President's Commission look substantial. Using a non-risk-adjusted rate to project equity returns makes future benefit reductions look much smaller.[16]

What does the earlier discussion about evaluating equity returns in defined benefit plans suggest about evaluating equity returns in private accounts? The first issue is that the answer depends on how the numbers are to be used. If the goal is to compare benefits under Model 2 with the current system for policy purposes, then the bond return is the appropriate assumption. The only way to get an

Table 4. SSA Risk-Adjusted and Non Risk-Adjusted Returns Show Very Different Outcomes

Percent Reduction from Scheduled Benefits for Average Earning Two-Earner Couple under Model 2

Year Turning Age 65	Percent Reduction from Scheduled Benefits	
	All-Bond Portfolio	Portfolio with Equities
2012	-0.5	0.0
2032	-15.2	-8.3
2052	-26.0	-6.3
2075	-39.6	-20.5

Source: Report of the President's Commission to Strengthen Social Security (2001). Strengthening Social Security and Creating Personal Wealth for All Americans. (December), p. 246.

Note: Since private accounts are voluntary under Model 2, this exercise assumes that two thirds of eligible workers opt to participate.

"apples-to-apples" comparison is to look at streams of income with similar risk characteristics, and bonds rather than equities have the characteristics most similar to benefits under the current system.[17]

For the Social Security reform debate, ignoring the risk of equities is the wrong approach.

The other issue involves individuals trying to assess their most likely total benefit under the reformed system. The natural instinct is to think that investing in equities will probably lead to a higher benefit, since equities have historically outperformed bonds. The extent to which individual participants can realize these higher returns, however, depends on their ability to manage the risk. If participants have other resources or can delay retirement, they could more easily weather market downturns. This flexibility can be very important. For example, a worker invested in equities would have received 36 percent more by delaying retirement from September 2002, when the market bottomed out, until September 2004. The problem is that many people do not have such flexibility. Social Security benefits are crucial for most, accounting for over 50 percent of income for two thirds of those 65 and over. And few can control the timing of their retirement. Thus, most future beneficiaries are not in a position to take a gamble. The implication is that projecting the expected return on equity investments without any adjustment for risk overstates the contribution of private accounts to retirement security.[18]

Conclusion

The issue of risk is crucially important when assessing the financial health of retirement plans. Actuaries and financial economists/accountants generally take quite different approaches. Actuaries generally contend that ongoing healthy entities should be able to reflect the higher expected returns associated with stocks when making their funding decisions. If things turn out badly, such sponsors have the resources to adjust contributions and get the plan back on track. But when the sponsor cannot easily make adjustments to offset disappointing returns, or can shift risk to workers, taxpayers, shareholders, or other employers (via the PBGC), the higher expected return on equities becomes irrelevant. In such cases, it is appropriate to follow the financial economists and accountants and discount future pension obligations at a low-risk rate. Government scoring agencies also take this approach and discount the pension liabilities of the Railroad Retirement System, which is assumed to "float on its own bottom," using a low-risk rate.

It would be wonderful if the treatment of equities in defined benefit plans translated perfectly into recommendations of how to project future balances in private accounts under Social Security. Unfortunately, it does not. Yet it does yield two useful insights. First, for policymakers, it seems most appropriate to use risk-adjusted returns when comparing alternative reform plans. Assuming bond returns on invested assets produces a stream of income most similar to benefits under the current system and produces the most meaningful apples-to-apples comparison. Second, when individuals want to assess their likely outcome under private accounts, those with some flexibility to manage the risk associated with equity investment might assume higher returns. But given that Social Security provides a modest benefit upon which the elderly rely heavily and most people have little ability to manage the risk, ignoring risk in equities is clearly not the right answer.

Endnotes

1 MaCurdy and Shoven (2001).

2 Siegel (1998).

3 Some economists have concluded that the rate of return on stocks is greater than can be explained by their greater riskiness. For example, see Mehra and Prescott (1985).

4 For discussion of pension fund investment strategies, see Bodie, Kane, and Marcus (2001). Some contend that equities should be eliminated from pension portfolios, arguing that liabilities should be "matched" with assets of similar risk profiles. This is controversial. The strongest case in favor of "hedging" seems to be situations where the plan sponsor faces a moral hazard in that it can shift the risk to another party. If the plan is not insured either implicitly or explicitly, the "all bond" approach is much less compelling. Excluding equities from a pension fund restricts pension sponsors to low-yield instruments and does not seem optimal.

5 The valuation issue is completely separate from the question of asset allocation, although the two are sometimes confused.

6 The federal government also has a defined benefit plan for all federal employees, but that plan does not invest in equities.

7 Gold (2000) raises a major question about precisely who should be viewed as the decisionmaker in pension funding and pension investments. He asserts that plan sponsors are merely intermediaries and, as such, not entitled to "risk preferences." The portfolio allocation, therefore, should be considered as reflecting the preferences of the shareholders and managers in the case of private plans, or citizens and policymakers in the case of public plans.

8 ERISA established the PBGC, a mandatory insurance program that imposes premiums on defined benefit plans, to insure workers against the loss of basic benefits. PBGC's maximum benefit guarantee is set each year under provisions of ERISA. For pension plans ending in 2004, the maximum guaranteed amount was $3,699 per month ($44,386 per year) for workers who retire at age 65. This guarantee amount is lower for those claiming payments before age 65. Kandarian (2003) summarizes the current financial condition of the PBGC.

9 The "current liability" is the present value of currently accrued benefits—a measure of the plan's liability if it were to terminate today. The current liability ignores future increases in salary and service, which figure in the calculation of the "continuing liability" used in the original ERISA funding calculation. The current liability is thus the present value of a smaller stream of benefits. But because it is calculated using a lower discount rate, the current liability can often be larger than the plan's continuing liability.

10 The debate centers on when to use the interest rate on "riskless" Treasuries to discount future pension benefit obligations and when to use the somewhat higher interest rates on riskier corporate bonds. As this brief focuses on the treatment of risk in equities, it ignores the interest rate debate and treats both Treasuries and corporate bonds as "low-risk" assets.

11 Reporting standards are specified by the Financial Accounting Standards Board (FASB). Its guideline in FAS 87 paragraph 44 requires pension sponsors to calculate benefit liabilities using a discount rate that reflects the assets (typically corporate bonds) used by insurance companies to fund annuity contracts.

12 For further discussion, see Milevsky and Orszag (2003).

13 Bader and Gold (2003) use swaps and futures ("Bader swaps") to show that the market value of the equity risk premium should be zero.

14 The Office of Management and Budget (OMB) provides a full discussion of the need to risk adjust expected returns: "Equities and private bonds earn a higher return on average than the Treasury rate, but that return is subject to greater uncertainty. Sound budgeting principles require that estimates of future trust fund balances reflect both the average return and the cost of risk associated with the uncertainty of that return. ... Economic theory suggests however, that the difference between the expected return of a risky liquid asset and the Treasury rate is equal to the cost of the asset's additional risk as priced by the market. Following through on this insight, the best way to project the rate of return on the fund's balances is to use the Treasury rate." OMB (2003) pp. 15-16.

15 Model 2 allows workers to divert 4 percentage points of their payroll taxes into private accounts up to $1,000. For the average worker, earning

about $35,000 in 2004, the $1,000 cap would amount to about 3 percentage points.

16 Option pricing techniques can also be used to calculate the risk-reward tradeoffs. See Bodie (2001).

17 Some could argue that future Social Security benefits are less certain than a bond obligation in that the system faces a financial shortfall and future participants face the political risk that benefits may be reduced.

18 Most economists today seem to agree on the need to risk-adjust the returns from Social Security private accounts. Geanakoplos, Mitchell and Zeldes (1998) note that "our view is that the risk-adjusted NPV measure is most helpful for ranking alternative" proposals. More recently, Diamond and Orszag (2004) also use risk-adjusted returns to evaluate proposals that include individual accounts. Some others, however, continue to embrace the "best-guess" actuarial approach to project Social Security Benefits. (e.g. Biggs 2002).

References

Bader, Lawrence N. and Jeremy Gold. 2003. "Reinventing Pension Actuarial Science." Pension Forum, Society of Actuaries 15 (January).

Biggs, Andrew. 2002. Testimony before the Senate Finance Committee Hearing on the Final Report Produced by The President's Commission to Strengthen Social Security. October 3, 2002.

Board of Governors of the Federal Reserve. 2004. "Flow of Funds Accounts of the United States: Flows and Outstandings, Third Quarter." Chart L.119.b and L.120. Federal Reserve Statistical Release.

Bodie, Zvi. 2001. Financial Engineering and Social Security Reform in "Risk Aspects of Investment-Based Social Security Reform" John Y. Campbell and Martin Feldstein, eds. Chicago: The University of Chicago Press.

Bodie, Zvi, Alex Kane, and Alan J. Marcus. 2001. Investments. 5th ed. 2002. New York: McGraw-Hill.

Congressional Budget Office. 2004. "Long-Term Anaylsis of Plan 2 of the President's Commission to Strengthen Social Securty." (July 21).

Diamond, Peter A. and Peter R. Orzag. 2003. Saving Social Security: A Balanced Approach. Brookings Institution Press.

Geanakoplos, John, Olivia S. Mitchell, & Stephen Zeldes. "Social Security Money's Worth". In "Prospects for Social Security Reform." Eds. O.S. Mitchell, R. Myers, & H. Young. Philadelphia, PA: Univ. of Pennsylvania Press, 1999: 79-151

Geanakoplos, John, Olivia S. Mitchell, & Stephen Zeldes. "Would a Privatized Social Security System Really Pay a Higher Rate of Return?" In "Framing the Social Security Debate." Eds. D. Arnold, M. Graetz, & A. Munnell. Brookings Institution, 1998:137-156. Reprinted as "Private Accounts, Prefunding, and Equity Investment under Social Security", in "Policies for an Aging Society", Eds. A. Altman & David Shactman, Baltimore: Johns Hopkins University Press, 2002: 266-292.

Gold, Jeremy. 2000. "The Shareholder Optimal Design of Cash Balance Plans." Mimeo.

Ibbotson Associates. 2003. Stocks, Bonds, Bills, and Inflation. 2003 Yearbook. Chicago: Ibbotson Associates.

Kandarian, Steven A. 2003. Testimony Before the Committee on Education and the Workforce. United States House of Representatives.

MaCurdy, Thomas and John Shoven. 2001. "Asset Allocation and Risk Allocation: Can Social Security Improve Its Future Solvency by Investing in Private Securities?" in John Campbell and Martin Feldstein, eds. Risk Aspects of Investment –Based Social Security Reform. Chicago: Chicago University Press.

Mehra, Rajnish and Edward Prescott. 1985. "The Equity Premium: A Puzzle." Journal of Monetary Economics. vol. 15, no. 2 (March), pp. 145-61.

Milevsky, Moshe A. and Michael Orszag. 2003. "Five Pension Myths." Financial Post. November 14, 2003.

National Association of State Retirement Administrators, 2004. "Public Fund Survey, FY 2003." (September).

Report of the President's Commission to Strengthen Social Security. 2001. Strengthening Social Security and Creating Personal Wealth for All Americans.

Seigel, Jeremy J. 1998. Stocks for the Long Run. 2nd ed. New York: McGraw-Hill.

U.S. Office of Management and Budget. 2003. Budget of the United States – Fiscal Year 2003. Budget System and Concepts.

Watson Wyatt. 2004. "Survey of Actuarial Assumptions and Funding."

Watson Wyatt. 2004. "Accounting for Pensions and Other Postretirement Benefits."

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