

LIFE-CYCLE PORTFOLIOS AS GOVERNMENT POLICY

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Life-Cycle Portfolios as Government Policy

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Summary

A life-cycle portfolio for personal accounts within Social Security, such as President George Bush has proposed, would adjust risk exposure as a function of the worker's age. This would involve the government in making complex dynamic portfolio decisions for individuals. The conventional rule of thumb that workers should invest a percentage of their portfolio equal to roughly 100 minus their age in stocks appears to be far from optimal. Choosing the optimal portfolio requires considering issues of behavioral economics such as why people do not already invest optimally and what kinds of people will sign up for the life-cycle portfolio.

KEYWORDS: Social Security, personal accounts, private accounts, lifetime portfolio allocation

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Academic economists, financial planners, and the designers of President George W. Bush's Social Security reform plan all seem to agree that investors should take a life-cycle approach to their portfolios in planning for retirement so that the portfolio changes with the investor's age to accord with changing risk exposures and preferences. This raises two issues, though. One is how to account for the human limits in managing portfolios that prevent many from dynamically adjusting their portfolios or from doing so well. The second issue is deciding what dynamic portfolio makes the most sense for the most people.

The Bush plan for personal accounts in Social Security has something of an answer to the first problem which is to allow individuals to choose a life-cycle portfolio managed by the government for their personal account and to make such a plan the default for workers aged 47 and older unless the worker and spouse both sign a waiver indicating that they understand the risks of failing to follow a life-cycle plan. Since the life-cycle portfolio by itself (without mixing any of the other portfolios) is recommended as a solution to the portfolio management problem, and since the plan defaults all workers into the life-cycle account, one may conclude that the life-cycle plan is the centerpiece of the President's Social Security plan. It is the most important original idea in the President's plan.

The second problem is more nettlesome. In fact, no one knows what the optimal portfolio is. Here I will report some disturbing findings. Using U.S. history as a guide, those who opt for the life-cycle portfolios that are common on Wall Street in lieu of ordinary social security benefits should expect no bonanza: expected returns would not be consistently more than the 3.0 percent per year "offset" that the worker must pay.¹

How can we evaluate and further develop the President's proposal and others like it? It will take some work. We must study the life-cycle options, consider the economic theory of lifetime portfolio management, and consider lessons from behavioral economics as well.

Can the government really design a life-cycle portfolio that is a good approximation to the optimal dynamic portfolio for workers who choose the plan? President Bush has not yet specified the design for the life-cycle portfolio. Assuming that there is a significant chance that some variation on the Bush

¹ To avoid depleting the Trust Fund, the President's Plan requires that the amounts diverted into personal accounts be cumulated at a 3% real interest rate, deducted from the personal account, and paid into the System by the worker upon retirement.

proposal will eventually be adopted in the U.S. or another country, this is a time when economists have an unusually important role to play in policy formulation.

The Modest Returns of Conventional Life-Cycle Portfolios

The conventional wisdom or rule of thumb is that the percentage allocation of portfolios to stocks should be 100 minus age in years. Several commercially-offered life-cycle mutual funds follow approximately this rule. The Vanguard 2045 Fund, intended for people who plan to retire around 2045, invests nearly 90% in the stock market today, but the stock allocation will eventually scale down to correspond to that of their Vanguard Target Retirement Income Fund, which today has only about 20% in the stock market. The T Rowe Price 2040 fund, for people who plan to retire around 2040, has a target of 90% in stocks today, but this allocation will be eventually reduced until it matches that in their Retirement Income Fund, roughly 40% in stocks.

President Bush has been promoting his personal accounts to the broad public substantially by extolling the high returns that people can expect to get from these funds. Often it seems that he is referring to the historically high returns in the stock market. But the life-cycle portfolio, not the 100% stocks portfolio, is the centerpiece of the plan.

A life-cycle plan that makes the percent allocated to stocks something akin to the privately-offered life-cycle plans may do much worse than a 100% stocks portfolio since young people have relatively little income when compared to older workers. There is a hump-shaped age-earnings profile, with earnings peaking in middle years. The life-cycle portfolio would be heavily in the stock market (in the early years) only for a relatively small amount of money, and would pull most of the portfolio out of the stock market in the very years when earnings are highest.

I have done a simulation study that investigates the outcomes of several life-cycle plans based on U.S. financial data 1871-2004. I used a long historical sample period to avoid relying on recent stock market data, which have shown abnormally high returns (over nine percent real on the Standard & Poor Composite over the last 25 years). In each simulation, I considered a typical individual contributing out of earnings to the personal accounts starting at age 21 and continuing until age 65, assuming that this individual's earnings follow the hump-shaped life-cycle pattern of the "scaled medium earner" defined by the Social Security Actuaries in their calculations. Using the data from 1871 to 2004, I extracted 91 44-year periods of data on stock market and bond market returns,

and used each of these periods as an example of the possible investment performance for the 44 years that a future 21-year-old worker would work until retirement at 65.

I found that with my baseline life-cycle portfolio that begins with 85% in stocks until age 30, then declining linearly to 20% in stocks at age 60, flat at 20% thereafter, the median internal rate of return on the portfolio is only 3.4%, hardly more than the 3% offset rate called for in the President's plan. Not surprisingly, 32% of the time the plan loses money after accounting for the offset: the worker is worse off at retirement from having chosen to participate in the life-cycle personal account. Worse yet, ten percent of the time the internal rate of return is less than 2.4%, and, accounting for the offset, the typical earner loses at least \$21,000 (in present value of future benefits) upon retirement after the offset for having chosen the plan.

In fact, however, the situation is probably even worse than that. The United States has been the most conspicuously successful economy in the world in the last century and more. A better assumption, then, is that the U.S. will experience something like the median world experience, and not its own remarkable success of the past. In an alternative simulation, I adjusted the stock market returns downward by 2.2 percentage points each year so that the geometric mean return 1871-2004 corresponded to median real stock market returns for 15 countries 1900-2000 found in Dimson, Marsh and Staunton [2002]. When the simulation was rerun with these data, the median internal rate of return on the baseline life-cycle portfolio was only 2.6%, which was less than the 3% offset rate. The investor loses money after the offset 71% of the time. The return is less than 1.4% ten percent of the time, far less than the 3% offset, thereby leaving the typical worker \$45,000 behind upon retirement for having participated in the life-cycle plan. For some workers with little other resources in retirement, there would be substantial hardship.

The fact that the life-cycle portfolio does so poorly so often suggests that the conventional rule is not optimal. The President may feel bound by conventional financial authority to use some already-established rule of thumb for the life-cycle plans, but if a strong enough case can be made for another plan, perhaps eventually such a plan could be offered.

Would Other Life-Cycle Plans be Better?

The median internal rate of return for a 100% stock portfolio with U.S. historical data was 5.9% (compared with 3.4% on the life-cycle portfolio) and it loses money with respect to the 3% offset only two percent of the time (compared with 32% of the time on the life-cycle portfolio). With the more realistic data adjusted for the entire world, the internal rate of return of a 100% stock portfolio was 3.7% (compared with 2.6% on the life-cycle portfolio with the same adjusted data), and it loses money 33% of the time (compared with 71% of the time on the life-cycle portfolio). The worst of the 91 outcomes is still worse for the 100% stocks portfolio than for the life-cycle portfolio, but still the overall advantages of stocks suggests that the baseline life-cycle portfolio is not aggressive enough.

With these risky opportunities, it might seem that the optimal life-cycle portfolio would stay heavily in the stock market for longer than the rule of thumb suggests, allowing young and middle-aged people to partake of these opportunities. But maybe we would not counsel people in the last of their working years to be 100% in stocks. And, are we taking all factors into account in making such simple intuitive judgments? What, then, *is* the optimal life-cycle portfolio?

Attention to economic theory suggests some interesting perspectives. In a celebrated 1969 paper, Paul Samuelson argued from theory that under plausible assumptions in the absence of labor income, the optimal life-cycle portfolio would *not* change the allocation to stocks through time. But Samuelson's paper led to other papers that pointed out that the labor income plays a critical role in the specification of a life-cycle portfolio (see Bodie, Merton and Samuelson [1992] and Campbell and Viceira [2002]). Younger people have a large proportion of their wealth in "human capital," and we might consider this as part of their true portfolio, of which the portfolio invested in financial assets is only a part.

Unfortunately, economists have no consensus about the implications of labor income for life-cycle portfolios. Modeling the stochastic properties of labor income in relation to financial markets involves a number of assumptions, and results vary substantially depending on these assumptions.

Given that human capital is a large part of the portfolio of young people, and assuming that the high past returns on the stock market can be extrapolated into the future, it might seem that the life-cycle portfolio for young people should be invested far over 100% in the stock market. Luis Viceira [2001] found that for plausible parameter values, young individuals should place 300% or more of their investable portfolio into stocks. Doing this would mean borrowing far more

heavily to buy stocks than current margin requirements allow, and would suggest that young people should be far more aggressive than the rule of thumb calls for.

On the other hand, authors, who make different assumptions than Viceira about the correlation of portfolio returns with earned income, find that young people might be best to invest only 20% in stocks, and that portfolio allocations to stocks should rise with age, not fall with age as is commonly assumed (see Benzoni, Dufresne and Goldstein [2004] or Lynch and Tan [2004]). An important issue is the assumption of the persistence through time in the correlation of labor income with stock market returns; if the correlation is highly persistent, then investing in stocks can be highly risky for young people.

The Importance of Behavioral Economics

Life-cycle plans also raise fundamental issues of behavioral economics. President Bush's plan offers an example of the impact of behavioral economics, since it chooses to default people into the life-cycle portfolio starting at age 47. They will be automatically in the plan if they do nothing. This design feature is up-to-date with recent findings in behavioral economics (see Johnson and Goldstein [2003] and Choi [2005]). If we want to allow those people who plan carefully to make their active choices and to prevent people who do not plan carefully from making mistakes, it is best to make the default option appropriate for those who do not plan, and create a little trouble to deviate from the default option. Presumably, many of the people who make the effort to deviate from the default are people who think that they know what they are doing. There will also be some people who will sign the waiver even though they *don't* know what they are doing, and they will be protected by making the riskiest portfolio option not too risky, and by prohibiting leverage and short sales. The President's plan shows real attention to behavioral economics.

But further reflection indicates that much more research in behavioral economics would need to be done to make a really attractive proposal for life-cycle accounts. If all individuals had solved the optimal life-time portfolio problem and were implementing it, then there would be no need for a personal account proposal for Social Security. People would already be investing in the optimal portfolio outside of the Social Security System, and would already be taking into account how financial markets interact with the social insurance implicit in the existing mandatory pay-as-you-go Social Security System as explained by Geanakoplos, Mitchell and Zeldes [2000]. The personal accounts

plan makes sense only if people are *not* doing that, and if we think the government should make them do that, then we had better understand their errors.

Consider people who have saved adequately over the life-cycle, but who are excessively fearful about risky investments like the stock market. They have invested their savings in excessively conservative investments. A design for a life-cycle account would then be to create an addition to their portfolio that *corrects* for the timidity of their portfolio, the personal account representing the *difference* between their actual portfolio and the optimal portfolio for them. Such a portfolio might well be much more heavily than 100% in the stock market for young people.

Alternatively, consider people who have taken on excessively risky investments, as by participating in stock market or real estate bubbles. Recent years reveal many such people. A life-cycle portfolio designed for them would ideally correct for their excessive risk taking, underweighting or hedging the risky assets that they already have in their portfolio.

Yet again, we must consider people who have not saved anything at all, and for whom Social Security is the only source of retirement income. One thing appears clear: if the President's plan is implemented with baseline life-cycle personal accounts, these no-savings people will be facing a substantial risk of financial hardship in their retirement.

Since these might be the predominant group who will choose the life-cycle accounts, we must study these people. We must learn how *their* labor income and private insurance needs and choices differ from those of the general population.

Consideration of the potential dangers to specific groups of people who might sign up in large numbers for the life-cycle accounts is a serious matter. Even if there is a relatively small group of people who will suffer extreme outcomes by signing up for a life-cycle portfolio that dramatically amplifies their mistakes, then the portfolio may come to be regarded in future decades as having a fatal flaw, and jeopardize the public's long-term commitment to the reformed Social Security System.

Taking both rational-optimizing models and behavioral issues into account in designing the life-cycle portfolio will involve substantial work. Unless there is convincing economic research, it will be hard to deflect government planners from something close to the conventional rule of thumb that the percentage of stocks in the portfolio should be 100 minus age. Given the interest among legislators in implementing a life-cycle portfolio, designing a structure that will

stand the test of time ought to be a major undertaking for the economics profession today.

Robert J. Shiller is a professor of economics at Yale University and is widely read both inside and outside academia. Most recently, he is the author of Irrational Exuberance, 2nd Edition, 2005.

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