
Liquidity-Related Plan Asset Issues

by Brian B. Murphy,
Mark K. Johnson
and W. Paul Zorn

By about 2025, most baby boomers will have retired, which will put a tremendous strain on public sector pension plans. Many will experience negative cash flows, and liquidity will be an increasing concern. Asset/liability studies can help measure the effect of this risk on system funding and contribution requirements, resulting in more informed asset allocation choices and benefit policies.

As the baby boomers pass their fifties and retire, benefit payments from U.S. retirement systems will increase rapidly. Recently, contribution levels to those retirement systems have been flat or falling due to extraordinary investment results that have been achieved since about 1982. In the coming years, retirement systems will find it increasingly necessary to draw down and replenish their short-term investment funds in order to close the gap between required benefit payout and available contribution income. This demand for liquidity will make the systems sensitive to financial market volatility and investment risk.

For example, without proper planning, it may be necessary to liquidate investments at inopportune times in order to meet cash flow requirements. Asset/liability studies can help measure the effect of this risk on system funding and contribution requirements, resulting in more informed asset allocation decisions and benefit policies.

Baby Boom Demographics

The social forces that evolved following World War II have shaped our culture for the last half century and will continue to shape it for years to come. The baby boomers, born between 1946 and 1964, form an enormous cohort of people moving through the life cycle, af-



The Authors

Brian B. Murphy (left) is a senior consulting actuary with Gabriel, Roeder, Smith and Company. He is responsible for statewide plans in several states and also works for municipal and county retirement systems. Mr. Murphy received a B.S., M.S. and Ph.D., all in mathematics, from Wayne State University and also studied at the University of Munich. He is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries and an Enrolled Actuary.

Mark K. Johnson (right) is a senior analyst for Gabriel, Roeder, Smith and Company. He has served a number of state and municipal retirement systems and uses his knowledge of pension funding and the in-house valuation system to provide programming and mathematical modeling advice to other analysts and consultants. Mr. Johnson holds a B.S. in actuarial science and economics from Eastern Michigan University.

W. Paul Zorn is director of governmental research at Gabriel, Roeder, Smith and Company. He specializes in research related to public retirement systems and employee benefit plans and acts as resource person on federal and state laws, accounting standards, Social Security and the benefits-related policies of national public sector organizations. Mr. Zorn received a B.A. in English from the University of Michigan and an M.A. in public policy studies from the University of Chicago.

fecting our culture politically, economically and socially. Recently, we have begun to see their impact in the areas of aging and retirement. Major innovations in medicine combined with decreased workplace safety hazards and changes in lifestyle are extending the longevity of most of the population. The life expectancy of the baby boomers is much greater than that of their grandparents. Also, for the most part, they married later and had fewer children, producing the “baby bust.”

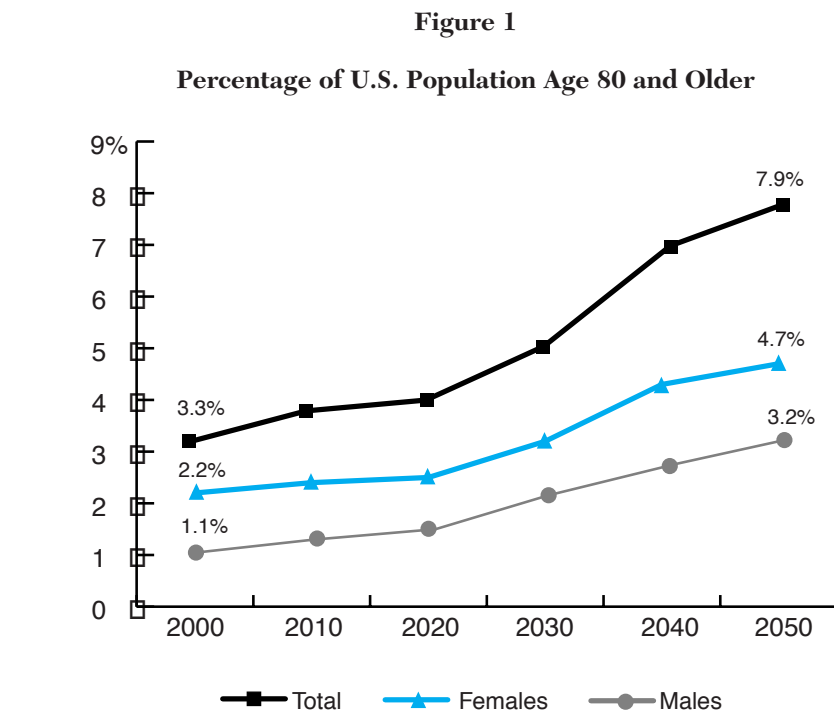
Because of these trends, the average age of the U.S. population will increase for the next 50 years. The percent of people in the zero to 49 age group will fall, while the percent in the 60 to 100 (or more) age group will increase. The proportion over 65 will rise from 12% today to over 20% by 2030, and the proportion age 80 and older will rise from 3.4% today to almost 8% by 2030.¹ Boomers will transition from young to old, working to retired, savers to spenders.

Given their longer life expectancy, women will be disproportionately represented among the very elderly. Females now have a distinct life expectancy advantage over males, with about a five-year difference between the sexes from age 60 (e.g., 19 years vs. 24 years). Figure 1 shows that, by 2050, the proportion of women age 80 and older will grow to 4.7%, up from 2.2% today. The percentage of men age 80 and older will grow to 3.2%, up from 1.1%. By 2050, approximately 19 million women and 13 million men will be age 80 and older.²

The aging of the population will strain our society’s ability to provide future retirement benefits. These strains are already apparent in the problems facing Medicare and Social Security. In addition, recent plan design changes may have a detrimental effect on retirement income. The adoption of defined contribution plans by many private sector and some public sector employers may make it difficult for individuals to set aside enough income to adequately finance lengthy retirements. Consequently, many retirees, especially elderly females, could face financial difficulty at a time when they are least able to deal with it.

Market Effects

The current demographic trends have themselves affected the investment mar-



kets. As the baby boomers entered the workforce in the 1970s and began to produce and invest, they helped to trigger the stock market boom that began in the mid-1980s. This boom was fueled in the 1990s by their efforts to save for retirement—largely through retirement programs of various types, but also through 401(k) plans, 457 plans and other types of savings/deferred compensation vehicles. Since about 1982, the market has almost consistently produced real returns that are unprecedented by historical standards. Can this continue? As the baby boomers retire, they will tend to become more conservative in their investment practices, investing less in common stock, and investing more in “safer” investments. This is likely to happen both on an individual basis and on a group basis (pension plans) and will most likely lead to a return to more traditional investment market behavior. Relatively fewer dollars will be chasing investments than is the case today. Ten percent and 15% investment returns in an environment of low inflation can last a long time, but not indefinitely.

Liquidity Needs of Pension Plans

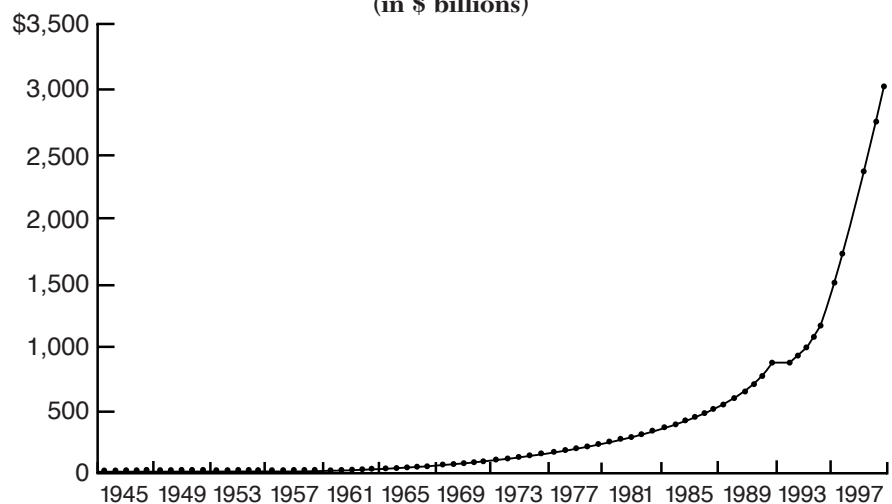
The inflows of money into retirement plans, coupled with a massive bull market,

have resulted in rapid improvements in plan funding. This, in turn, has enabled plan sponsors to increase benefits and/or reduce contribution rates. For example, Figure 2 illustrates the rapid, almost exponential growth of state and local government retirement plan assets from \$2.6 billion in 1945 to \$3.0 trillion in 1999.³ As a result, the average ratio of assets to actuarial accrued liabilities (i.e., the funding ratio) for state and local plans has strengthened. A recent survey by the Public Pension Coordinating Council shows state and local retirement plan funding ratios increased from 86% in 1996 to 95% in 1998. At the same time, average employer contributions fell from 13.2% of covered payroll to 11.4%.⁴

Although the dramatic improvement in plan funding is good news for current and future retirees, it also raises questions regarding the sensitivity of benefit and contribution levels to future investment volatility. Basically, funding requirements are much more volatile in a plan that has a high ratio of assets to liabilities than in a plan that does not. For the last 20 years or so, the volatility has been mostly on the downside. Can today’s benefit levels be sustained if upside volatility returns and there is a need to increase contributions significantly above current levels?

Figure 2

Total Financial Assets of State and Local Government Employee Retirement Systems
(in \$ billions)



At the same time that bull markets are prompting plan sponsors to reduce their contributions, employee unions are bargaining for higher benefits. In addition, some forward looking plan sponsors and union groups recognize the need to plan for retiree health care and are allocating a portion of their funding to retiree health benefits. However, what may be overlooked in these efforts to use the pension “surplus” is the fact that the surplus is measured based upon assumptions regarding future investment results and may cease looking like surplus once the baby boomers retire. Many pension plans are nearing or have actually passed the point where benefit payments exceed income from contributions. This has important implications for the plans’ liquidity needs and asset allocation. It is an early sign that the baby boomer effect is beginning to materialize.

The basic retirement funding equation requires that contributions plus investment return equals benefits paid plus plan expenses. If benefits paid exceed contributions, there is only one other source for the additional funds: investment *income*. Selling current investment holdings and/or increasing the percent of the portfolio allocated to interest bearing securities can produce investment income. If not properly planned, both of these choices could ex-

pose the retirement plan to potential reductions in total investment return.

The sale of investment holdings, especially equity holdings, can actually reduce the plan’s long-term rates of return. Following the sale, a lower percentage of the portfolio would then be invested in higher yielding securities, causing the overall return of the fund to suffer. Similarly, if a higher percentage of the portfolio were invested in interest bearing securities, the overall portfolio return would be lower. Such investments have historically earned lower return than many other types of investments, and are likely to continue to do so. Assets that produce high income tend to relate to more mature corporations with a reduced ability to produce capital gains.

While these shifts in asset allocation may have only a marginal impact in the near future, they will likely have an increasingly important effect as the baby boomers retire. The boomers’ transition from savers to spenders will place pressure on pension systems to liquidate plan assets or to increase the proportion of the portfolio held in interest bearing securities. The negative cash flow (i.e., benefit payments in excess of contributions) that is now beginning will likely increase on an annual basis and peak somewhere in the range of 7-8% of assets for some plans before stabilizing in

the range of 3-5% of assets by perhaps 2030. At some point in the process, the negative cash flow may begin to look like a hemorrhage. Many retirement plans may be trying to sell off substantial portions of their portfolios, driving down investment prices. This could cause the volatility associated with various asset classes to increase even more.

Using Asset/Liability Models to Manage Liquidity

The challenge is to manage future cash flows while maintaining strong investment returns and a stable pattern of contribution rates. To meet this challenge, it is essential to determine the appropriate asset allocation. Within this framework, an asset/liability model (ALM) can be a useful tool. Given a stream of benefit payments, the model can evaluate whether a given asset allocation will produce enough income to meet plan liabilities while remaining within the risk tolerances specified by the plan sponsor. The results of the analysis can also inform decision makers about how such risks are translated into future contribution rates and potential benefit changes.

A major advantage pension funds have over individual investors is that the funds can share (or pool) risks across large numbers of participants and over long time periods. This allows the funds to assume higher levels of asset risk without endangering their ability to provide benefits to participants. An ALM analysis can identify the crossover point between risk and reward when considering exposure to different asset classes.

For example, assume the State of Euphoria Retirement System has its actuary prepare an ALM analysis. Assume also that contributions currently equal benefit payments. In the future, contributions will increase at a much slower rate than benefit payments such that 30 years from now the negative cash flow will be about 3% of assets per year. The board has two objectives: (1) a reasonable contribution rate and (2) a high probability of meeting cash flow needs with few forced liquidations. The question is: What is the optimal asset mix?

At one extreme, a low asset volatility with 0% in common stock yields a high

probability of meeting cash flow needs, but at the cost of a high contribution rate due to lack of adequate return. At the other extreme, attempting to maximize returns with 100% stock allocation yields a low contribution rate, but at the expense of a low probability of meeting cash flow needs. In this example, an ALM analysis might show a happy medium at 60% common stock exposure, where there is a high likelihood of meeting cash flow needs at a reasonable contribution rate. (See Figure 3.)

While the example in Figure 3 is only intended to illustrate a simple ALM analysis, multiple analyses can be done assuming varied rates of return and asset mixes. This can be approached deterministically or stochastically. A deterministic approach would provide a comparison of several scenarios, with each based on a different predetermined investment return assumption (and possibly other varied assumptions). The varied results would then be compared to provide a range of values for key indicators under consideration. Figure 4 illustrates the results of a deterministic asset/liability model analyzing projected contribution per-

centages under multiple assumptions regarding market rates of return.

Alternatively, a stochastic approach uses a large number of rates of return for a given asset mix based on historical and projected information regarding the asset classes. Sets of many different scenarios are generated and grouped into classes of outcomes. From this, the probable outcomes for a given asset mix can be generated. Figure 5 illustrates the results of a stochastic asset/liability model of plan contribution percentages under alternative market rates of return. Readers should note that the line at the top of each shaded area marks the percentile shown in the figure's legend.

The results of an ALM analysis can then be used to help formulate invest-

ment strategies or benefit policies. One such investment strategy, called *asset/liability matching*—also known as *portfolio dedication* or *matched funding*—seeks to reduce the uncertainty of long-term investment results as they relate to specific liabilities. It does this by dedicating an asset type and amount to a specific set of liabilities. The “match” is based on the length of time until the liability is payable (duration), with longer duration liabilities often matched with riskier assets (earning higher assumed returns).

In its simplest form, asset/liability matching involves purchasing fixed-income securities with coupon and principal payments that exactly match the liability payment dates. However, this “cash matching” strategy offers little latitude for selecting higher yielding securities with longer maturities. To remedy this deficiency, other matched funding strategies have been developed. Bond immunization, for example, seeks to maintain a fixed income portfolio such that both the present value and the duration of the assets equal the present value and duration of the liabilities. Theoretically, this protects the portfolio from swings in interest rates and allows investments in a broad range of fixed income securities with varying maturities.

The complexities involved in maintaining a fully immunized portfolio, however, have led investment technicians to look for ways of blending cash matching and immunization strategies. Horizon matching divides the stream of payments into two time periods and applies a cash matching strategy to the first period (e.g., the first five years) and an immunization strategy to the later payments. This simplifies portfolio administration while allowing for a wide range of fixed income securities.

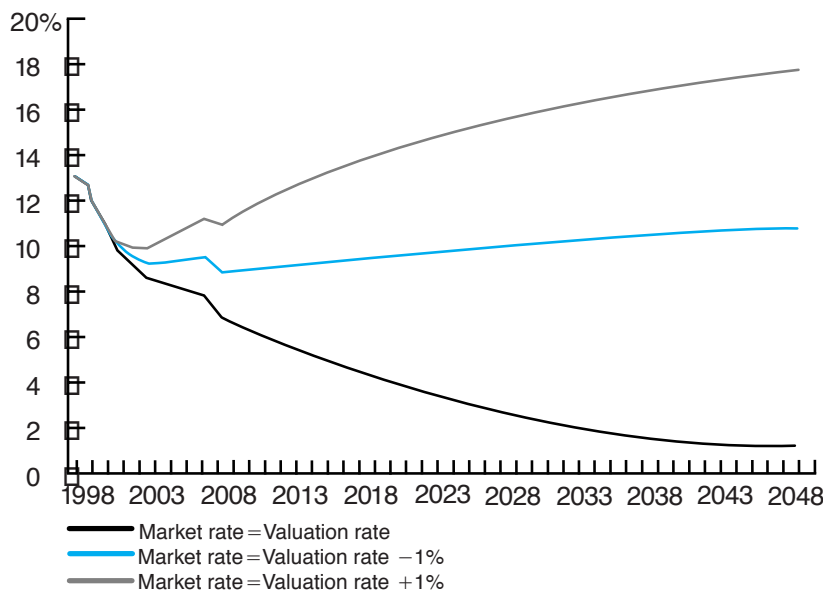
Figure 3

Example ALM Analysis for the State of Euphoria

	Common Stock Percentage		
	0%	60%	100%
Rate of Return	6	8	10
Contribution Rate	14	11	7
Probability of Success	99	90	60

Figure 4

Illustrative Results From a Deterministic Asset/Liability Model
Contribution Percentages Under Alternative Market Rates of Return



“In its simplest form, asset/liability matching involves purchasing fixed-income securities with coupon and principal payments that exactly match the liability payment dates.”

Editor’s note: This article is based upon Brian Murphy’s presentation at the IFEBP 2000 Benefits Conference for Public Employees.

Endnotes

1. Population Projections Program, Population Division. *Projections of the Total Resident Population by 5-Year Age Groups, and Sex with Special Age Categories: Middle Series, 2025 to 2045*. (Washington, D.C.: U.S. Bureau of the Census, 2000).
2. Population Projections Program, Population Division. *Projections of the Total Resident Population by 5-Year Age Groups, and Sex with Special Age Categories: Middle Series, 2050 to 2070*. (Washington, D.C.: U.S. Bureau of the Census, 2000).
3. Board of Governors of the Federal Reserve System, *Flow of Funds Accounts*. (Washington, D.C.: Board of Governors, various years).
4. Public Pension Coordinating Council. *2000 Survey of State and Local Government Employee Retirement Systems*. (Chicago: Government Finance Officers Association, 2000).

Other approaches are also available, including contingent immunization and dynamic hedging.

Always, a proper objective is to maximize the probability of meeting expected cash flow needs while achieving returns that are commensurate with the plan sponsor’s risk and return objectives. However, it is important to recognize that ALM analysis goes beyond simply supporting asset/liability matching strategies. Because ALM analysis is designed to test how different assumptions act together on plan assets and liabilities, it provides a tool for examining a broad group of economic and policy issues, ranging from employer contribution rates to the cost of proposed benefit changes.

Conclusion

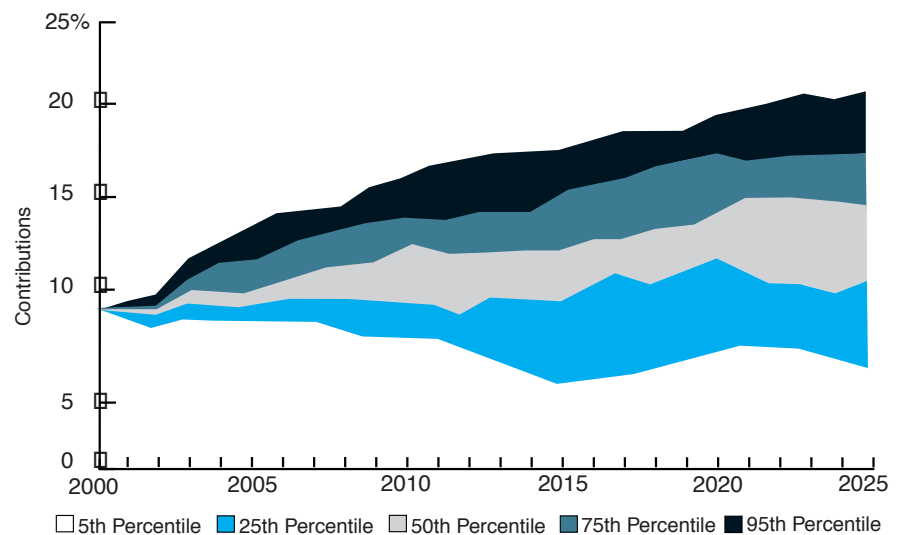
In today’s markets, so much investment return is being produced that asset/liability modeling may appear to be a “make money” scheme for actuaries and investment consultants. In future markets, however, it may mean the difference between meeting benefit payments comfortably and relying on our children for retirement income.

By about 2025 or so, most baby boomers will have retired. This will put an enormous strain on pension plans, on Social Security and on the Medicare system. Many pension plans will experi-

ence negative cash flows, and liquidity will be of increasing concern. Asset/liability studies can help measure the effect of this risk on system funding and contribution requirements, resulting in more informed asset allocation decisions and benefit policies. ♦

Figure 5

Illustrative Results From a Stochastic Asset/Liability Model Contribution Percentages Under Alternate Market Rates of Return



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