

Actuarial Factors

A Publication of G.S. Curran & Company, Ltd.

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Actuarial Asset Smoothing

Almost all pension funds use some form of asset smoothing as part of the process of determining pension contributions. The purpose of such a procedure is to moderate fluctuations in contributions that result from the erratic behavior of both the equity and fixed income markets. Smoothing is usually accomplished by averaging income over some period, but the specifics can vary according to any number of parameters. The income smoothed may include both realized and unrealized gains (and losses) or may be tied to some benchmark such as the actuarial rate of return. Equities and fixed income securities can be treated alike or separately using different techniques. The smoothing period typically ranges from three to five years.

generated each time a security is sold.

For equity as well as fixed income investments, a process by which capital gains and losses are averaged over a stated period is often employed. The theory behind this approach is that, over several years, up and down markets will to some extent offset each other. However, when the market enters prolonged and/or extreme bull or bear phases, the effectiveness of smoothing techniques is limited. Smoothing is designed to handle the ordinary fluctuation of markets, not to eliminate the impact of extraordinary market gains or losses. Longer smoothing periods do present a greater measure of protection against prolonged bear markets, but they risk underfunding the plan when returns remain below expectations for extended periods of time. Longer smoothing periods defer the impact of prolonged bull or bear markets; they also lengthen the recovery phase as markets return to normal levels. Since gains and losses are averaged with previous periods, the effect of the recovery on contributions is temporarily diluted when long smoothing periods are used.

Fixed income returns can also be smoothed by using the amortized cost of securities rather than market value to determine the amount of recognized investment income. This procedure has the advantage of greatly reducing the volatility of fixed income returns by eliminating from investment income the short-term effect of changes in interest rates on the prices of the securities. However, this technique can only be used effectively if bonds are largely employed in a buy and hold strategy. The active management of bonds reduces the advantage of the method since realized capital gains or losses are

Asset smoothing does introduce some level of inefficiency in the investment process. Without smoothing, during periods of high

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Forecast Valuations - A Strategic Planning Tool

Typically, public retirement systems perform an actuarial valuation annually. This process is used to determine the liabilities of the retirement system as of the end of the fiscal year and the required actuarial contribution rate or dollar amount for the next fiscal year. The valuation report usually includes analysis by the actuary of various factors that affect costs. Historical information can be used to review assumptions and to advise the system's board of trustees on cost trends.

Although useful in determining current liabilities and contribution rates, traditional valuations are constructed based on static populations and assumptions and thus have limited applications for long range planning. Forecast valuations can provide greater strategic and tactical planning capabilities for the retirement system's board of trustees.

A forecast valuation study can be used for planning in a number of ways. The following are some of the most valuable uses:

1. Testing the effect on contributions of proposed benefit changes.
2. Determining possible contribution outcomes given the system's current asset allocation and liability structure.
3. Providing a review of the system's contribution rate sensitivity to investment gains or losses.
4. Testing the cash flow needs and/or prospects of the retirement system based upon numerous potential investment return scenarios.
5. Deriving asset allocations by integrating asset returns and volatility expectations with the liability structure.

The performance of a full forecast valuation study may include the creation and use of a complicated computer model of the inflow and outflow of plan membership due to entry, termination, disability, retirement, and death. The model will include the particular benefit structure, eligibility requirements, the actuarial methods and assumptions used to value the plan's liabilities, the actual data related to

each member and benefit recipient, and the actual beginning value of assets. In a deterministic model, plan demographic characteristics such as age and sex distribution of new entrants to the plan are modeled, and the rate of overall plan population growth is incorporated into the process. Asset expectations based on realistic investment scenarios are additional components of the input. These scenarios can be taken from actual investment returns of a similar portfolio over multiple periods of the past, or be created to test the potential effect of particular periods of "stress" in the markets. When all of this information is put together, plan cash flows, liability present values, asset levels, and required contribution levels can be produced for each year covered in the scenario. This information can serve to guide the decisions made related to benefit changes and investment policy. By understanding the range of normal outcomes as well as the level of possible, but extreme, outcomes for the particular plan, a board of trustees has a greater ability to make educated decisions.

Services We Offer:

- Benefit Certification (Complete Review of Files)
- Benefit Verification (Review of Calculations Only)
- Cost of Purchases and Transfers of service credit
- Actuarial Valuations of plan liabilities
- Cash Flow Analysis
- Forecast Valuations
- Analysis of the cost of proposed benefit changes
- Development of Member Handbooks
- Audits of System Databases
- Custom Retirement Benefit Calculation Software
- Asset Allocation Analysis
- Production of participant benefit statements

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market performance, contributions are diminished; thus, fewer dollars are invested at market tops. Conversely, as markets decline, contribution rates increase, forcing the fund to invest greater amounts at

market lows.

Smoothing of assets reduces the effect of this “buy low-sell high” strategy. To some extent this is the price to be paid for lower volatility. All of the above factors re-

inforce the proposition that the smoothing technique employed must be matched to the asset allocation and investment strategy of the system in order to be effective.

The Cost to Fund COLA's

Among public retirement systems, provisions for post-retirement benefit increases are usually subject to certain limitations in the form of statutory and cost constraints. Recent concerns have focused on statutory constraints that often have limited the trustees' ability to provide retiree COLA's. These limitations vary from one system to another, but typically focus on funded ratios and rates of return. As investment performance has lagged below actuarial assumed rates, “excess interest” has not been available to offset COLA costs. Eventually, investment returns will increase; and trustees will be able to grant COLA's insofar as statutory requirements are concerned. However, the cost may be an equally difficult problem to deal with.

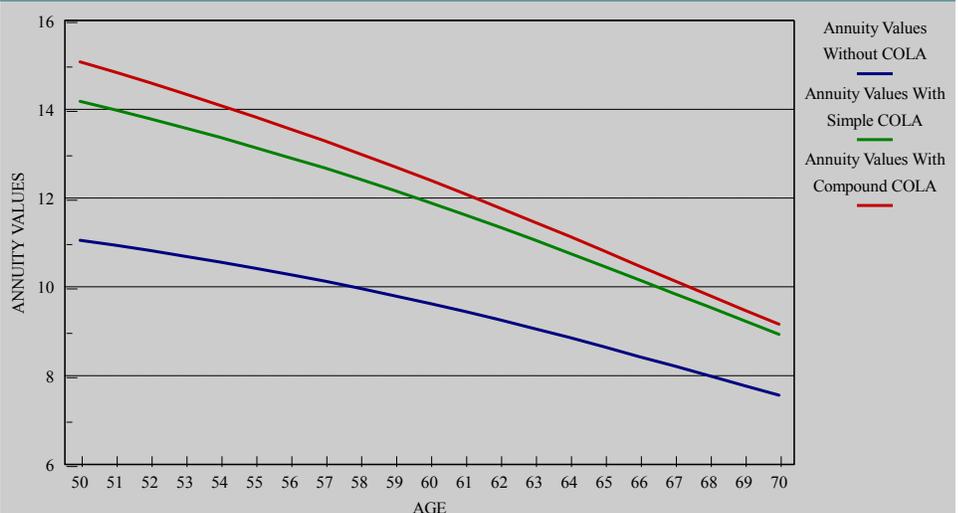
As a percent of liabilities, individual COLA's represent a small fraction of overall pension costs in any one year. As a percentage of payroll a COLA payable for life (without guarantee of any future increases) can increase the employer cost from 0.1% to 1.0% of payroll, depending upon the level of the COLA granted and the demographic distribution of the retired and active groups.

Ideally, funding COLA's during

active employment would provide a more stable basis of payment for retirees, but the cost of this approach can be steep. The life annuity value for level and increasing annuities can illustrate the impact on funding of COLA costs. For example, funding the pension of a sixty-year-old male at \$1,000 per year with monthly payments requires assets of \$9,628 (based on fairly typical actuarial assumptions). These same assumptions produce cost levels of \$11,904 and \$12,408 for the same benefit with built in 3% simple and compounded increases respectively. Hence these COLA's (the first based on

the base benefit; the second based on the current benefit) increase the cost of pensions by 24% to 29% for this particular age and set of assumptions. Whether the costs are prefunded or not, ultimately contributions must be made to offset these costs and the amounts can be substantial. Throughout the 1980's and 1990's, trustees relied on investment performance above assumed levels to offset these costs. For at least the foreseeable future it is unlikely that employers will be able to escape contribution increases if retiree COLA's are granted.

Annuity Values: With and Without COLA's



The above graph illustrates the comparative costs of providing an annual retirement benefit of \$1 for life at various ages with and without COLA's. The annuity values are based on the 1983 Group Annuity Male Mortality Table and an 8% interest assumption. (A simple COLA is calculated as a percentage of the original benefit; a compound COLA is calculated as a percentage of the current benefit. Costs are based on a 3% annual COLA payable for life.)

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One Actuary's Perspective



Money managers, consultants, trustees, and even actuaries have felt the stress produced by recent market performance. As funded ratios sink and contributions rise, everyone wants to

1930's and 1970's drastic declines were interlaced with years of substantial increases. After four years of drastic declines, large company stocks returned 54% in 1933 followed by

know how bad things get. We can't depend on future markets to repeat historical patterns, but it may give us some solace to note that even in the

one essentially flat year and two further years of returns above 30%. Though declines were not as severe in the 1970's, the recovery patterns were similar.

With contributions continuing to increase, trustees should understand that a return to "normalcy" in investment performance will only stabilize the status quo. It will not in and of itself reduce costs. It will take several years of superior performance to begin to produce reductions in required contributions. While expectations are low for the foreseeable future, markets will eventually begin to outperform assumptions and costs will abate.