WORLD GOLD COUNCIL
PORTFOLIO LETTER NO. 14
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RECENT POOR PERFORMANCE OF U.S. PENSION FUNDS:

Favorable Implications for Gold Investment

In the past two years, many U.S. defined-benefit pension funds have moved from surplus into deficit. This swing stems from: (1) the large decline in the value of pension assets due to the fall in the stock market, and (2) the increase in pension liabilities due to the decline in interest rates. Many pension fund managers have been surprised to find out that the portfolio diversification strategies they employed to cushion the effects of a possible decline in the financial markets, have not worked as anticipated. The failure of many portfolios to perform as expected has led many observers to believe that the traditional mean-variance optimization approach used for asset allocation does not work when it is most needed.

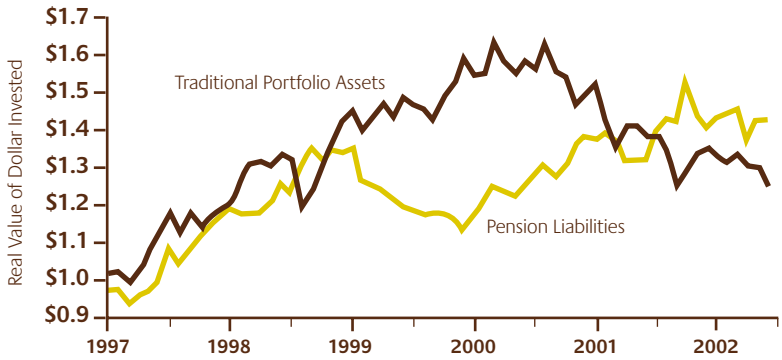
In the World Gold Council's Gold Portfolio Letter No. 11, *Managing Portfolio Risk for Periods of Stress* (December 2000), it was demonstrated that a new method of portfolio allocation, called stress-aware analysis, can be used to construct efficient portfolios that outperform traditional portfolios during periods of financial-market "stress" (unusual volatility and/or correlations).[1] An interesting feature of Stress-Aware Efficient Portfolios (SAEPs) is that they contain a modest amount of gold. Building upon these findings, the WGC recently commissioned new research to evaluate the effect of a portfolio's performance on a pension plan's surplus and funding ratio (assets divided by liabilities) over a wide range of investment conditions. The research results indicate that a typical pension fund is more likely to preserve or improve its surplus using SAEPs containing gold rather than using traditional portfolios.

Chart 1 below illustrates the increase in pension liabilities against a backdrop of the steep decline in assets since 2000. Traditional pension fund assets are depicted by the inflation-adjusted performance of a portfolio consisting of 75% in equities, 20% in bonds and 5% in cash. The Ryan Labs Liability Index, deflated by Ibbotson's U.S. Inflation Index, has been used as a proxy for changes in real pension-fund liabilities.

chart I

Increase in Pension Liabilities vs. Decline in Assets

Real Value of One U.S. Dollar Invested Jan. 1, 1997 – June 30, 2002 (Rebalanced Monthly)



Traditional U.S. Pension Fund Assets	Type	Weighting
Ibbotson Associates Total Return S&P 500 Index	Domestic large cap.	50%
Ibbotson's Total Return U.S. Small Cap. Stock Index	Domestic small cap.	5
Morgan Stanley Capital Index: Europe, Africa, Far East Total Return Index	International equities	20
Ibbotson's Total Return U.S. Long-Term Gov't Bond Index	Bonds	20
Ibbotson's Total Return U.S. 30-day T-Bill Index	Cash	5

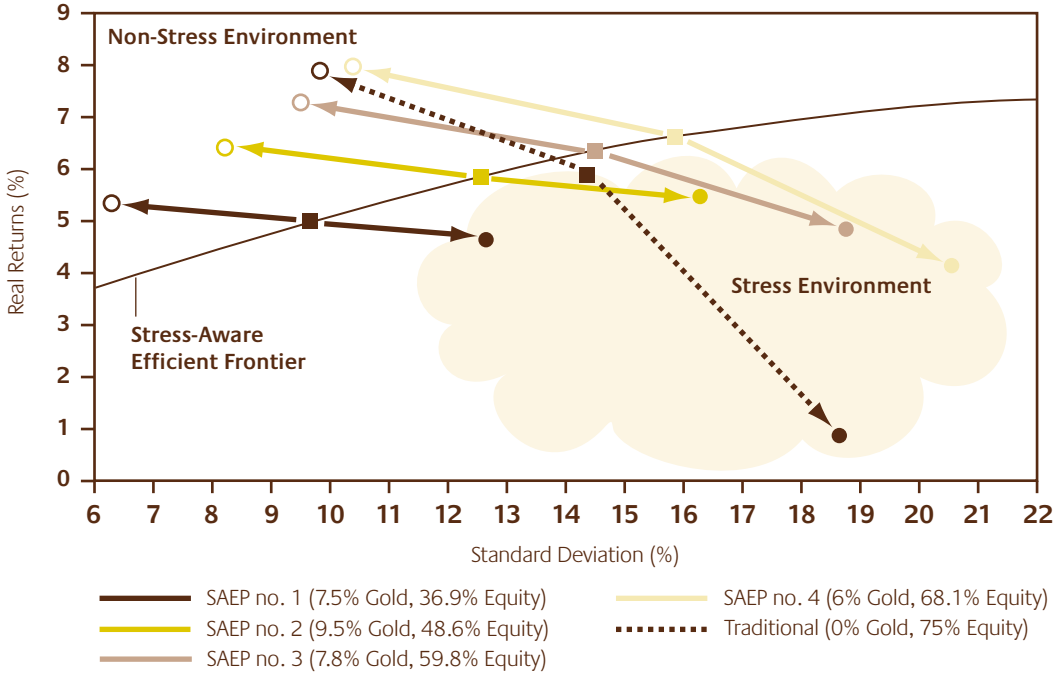
Underfunding (when pension fund liabilities are greater than pension fund assets) can hurt a pension plan sponsor in several ways. First, it can adversely affect corporate cash flow if the corporation needs to contribute additional funds to its pension fund to make up any shortfall. In the case of public plans, this shortfall represents a budget deficit item. Second, when a pension plan is significantly underfunded, accounting standard FAS 87 can require that the liability be reported on the plan sponsor's balance sheet. Increased corporate liabilities could create problems with existing loan covenants or increase future borrowing costs for the corporation. Loss of surplus could result in a pension expense being incurred, thereby reducing the sponsoring company's reported earnings. Further, actual pension fund returns must exceed or equal return assumptions made by the actuaries to avoid the need to report "actuarial losses". Finally, a decrease in a pension plan's surplus may make paying increased premiums to the Pension Benefits Guaranty Corporation[2] unavoidable.

For the above reasons, asset allocation methods must ensure that portfolio performance is as consistent as possible and near expectations under all types of financial conditions (ranging from stressful to non-stressful). As already stated, Stress-Aware Efficient Portfolios produce more consistent results during both stress and non-stress periods. In *chart 2,* a portion of the Stress Aware Efficient Frontier (thin brown line) is presented. The portfolios included on the efficient frontier contain U.S. equities, non-U.S. equities, Treasury bills, long-term Treasury bonds and gold. The assumption made in developing this efficient frontier is that there is an equal likelihood of either a stress or non-stress period occurring. Notably, gold appears in many portfolios along the efficient frontier, ranging from very conservative, low-risk (as measured by standard deviation) portfolios with smaller equity weightings to aggressive, high-risk portfolios with greater equity weightings.

chart 2

SAEPs Perform Well in Both Stress and Non-Stress Environments

Five Year Monte Carlo Simulation with Quarterly Rebalancing



Next, Monte Carlo simulations of future returns were carried out for both stress and non-stress periods for a variety of portfolios on the efficient frontier to test the consistency of their performance. Based on the results of these simulations, four SAEPs with relatively conservative risk exposures (ranging from 9% to 16% standard deviation) and expected annual real returns, ranging from 5% to 7%, were developed.

During periods of stress (represented by the solid circles in the chart), SAEPs 1-4 earn roughly similar returns, in the 4 to 5.5% range. These portfolios contain gold holdings ranging from 6% to 9.5% and equity holdings ranging from 37% to 68% (see legend). The returns of these portfolios during stress periods decrease as the equity portion of the SAEP portfolios increases. In contrast, the traditional portfolio (with 75% equity, 20% fixed income, 5% cash) performs badly during stress periods, with returns dropping to less than 1%.

SAEPs also perform well under non-stress conditions (open circles in the chart). As might be expected, the higher the equity weighting in the SAEP, the greater are the returns. Notably, SAEP no. 3 (8% gold and 60% equities) enjoys about the same return during non-stress periods as does the traditional portfolio, but over 4 percentage points superior returns during stress periods.

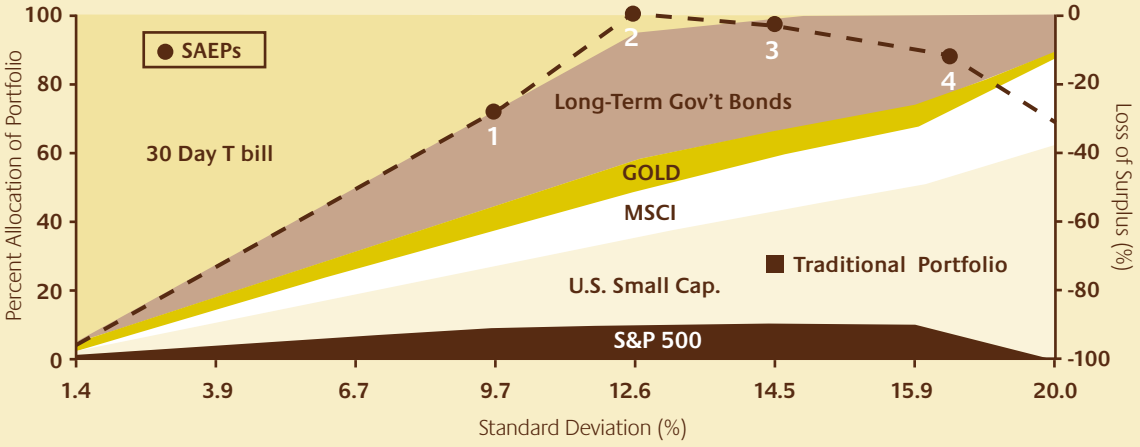
Next, to determine if SAEPs are superior to traditional portfolios in preserving a pension fund's surplus, the portfolios were evaluated for both stress and non-stress environments using a 5-year Monte Carlo simulation technique. The objective of the evaluations was to identify which portfolios protect the plan's surplus most effectively during periods of stress, yet are not so conservative that they sacrifice surplus gains during periods of non-stress. The simulation assumed that the portfolios were rebalanced each quarter.

For the purposes of this simulation, a $150 million pension portfolio was examined with an initial surplus of $30 million. The result of the simulation is demonstrated in *chart 3*. The left-hand axis indicates the portfolio allocation, while the right-hand axis indicates the loss of portfolio surplus during stress periods. SAEPs perform better than the traditional portfolio during stress periods. SAEPs 1 through 4 result in smaller losses of the pension surplus (ranging from 0 - 30%) than does the traditional portfolio that loses over 70% of its surplus.

chart 3

SAEPs Preserve Surplus During Stress Periods

Surplus Loss During Stress Periods



But do SAEPs give up too much profit during non-stress periods? *Chart 4* shows the average increase in the surplus for the portfolios after 5-year Monte-Carlo simulations have been performed in the non-stress environment for both the SAEPs and the traditional portfolio. The results indicate that all of the SAEPs record higher returns in non-stress than in stress periods; not surprisingly, the rates of return rise as the proportion of equities held in the portfolios rises.

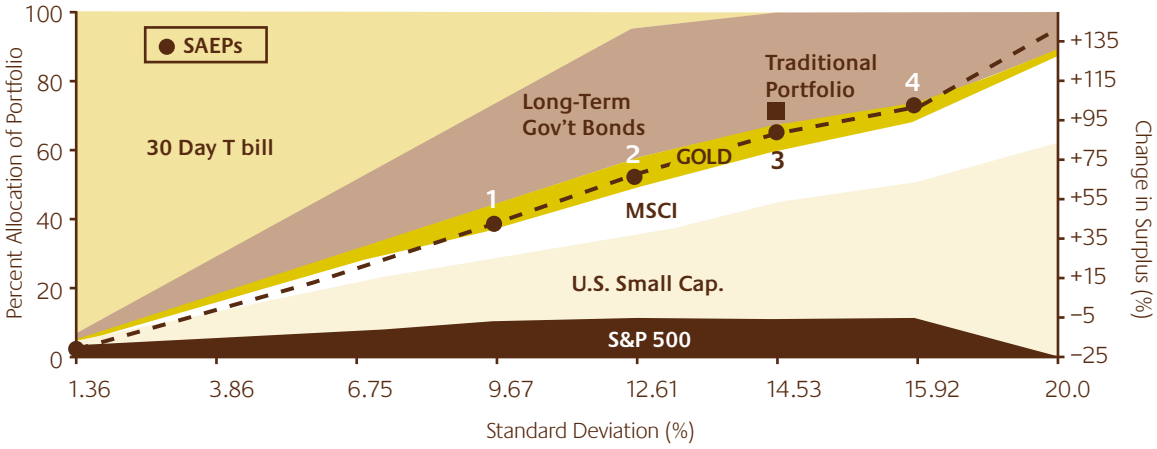
[1] This method was described in "Optimal Portfolios in Good Times and Bad", George Chow, Eric Jacquier, Mark Kritzman, and Kenneth Lowry, Financial Analysts Journal, May/June 1999, pp. 65-73. Stress periods or "multivariate outliers" are defined as a set of contemporaneous returns that is collectively "unusual" for one or more reasons.

[2] A U.S. government agency established under the Employee Retirement Income Security Act that provides retirement payments to defined benefit plan participants when the sponsoring company fails.

chart 4

SAEPs Perform Well During Non-Stress Periods

Surplus Gain During Non-Stress Periods



Notably, the research results show that the traditional portfolio performs only slightly better than the SAEPs in a non-stress environment. In other words, SAEPs do not sacrifice surplus gains relative to traditional portfolios.

Summary

The main findings of the WGC's latest research on Stress-Aware Efficient Portfolios indicate:

* Stress-Aware Efficient Portfolios with a 6 to 9.5% weighting in gold perform better than traditional (mean-variance optimized) portfolios in a wide variety of investment market environments.
* SAEPs preserve a pension fund's surplus better than traditional portfolios by a substantial margin during periods of financial-market stress.
* SAEPs with gold grow a pension fund's surplus in good markets.
* SAEPs with gold reduce or eliminate the need to make forecasts of future market conditions.
* SAEPs reduce or eliminate the need for unanticipated contributions to the pension fund.

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