

WORLD GOLD COUNCIL



MANAGING PORTFOLIO RISK WITH GOLD

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The World Gold Council is a non-profit trade association whose mission includes demonstrating how gold can play a useful role in today's portfolio management. Most investors have a fixed perception of gold and may not be aware of gold's ability to control portfolio risk.

In fact, many investors are surprised to hear that gold is helping a number of portfolio managers to solve some interesting problems. It is helping managers meet their fiduciary responsibilities when used as a risk management tool. The calculations and methodology in this presentation are based on authoritative outside sources.

The Hedging Instrument: Gold

- ◆ **Primarily a “monetary asset”, partly a “commodity”**
- ◆ **Gold has significantly outperformed other commodities over the long run**
- ◆ **“Currency Without a Country”
Not dependent on any corporation or government’s promise to pay**

There are some basic characteristics of gold that make it such a unique asset. First, it is primarily a monetary asset, and partly a commodity. As much as two thirds of gold’s total accumulated holdings relate to “store of value” considerations. Holdings in this category include: central bank reserves, private investments, and high-caratage jewelry bought primarily in developing countries as a vehicle for savings. Thus, gold is primarily a monetary asset.

Less than one third of gold’s total accumulated holdings can be considered a commodity: jewelry bought in Western markets for adornment, and gold used in industry.

The distinction between gold and commodities is important. Gold has maintained its value in after-inflation terms over the long run, while commodities have declined.

Some analysts like to think of gold as a “currency without a country”. It is an internationally-recognized asset that is not dependent upon any government’s promise to pay. This is an important feature when comparing gold to conventional diversifiers like T-bills or bonds which, unlike gold, do have counter-party risk.

Determinants of the Gold Price

	Weight
Gold Supply	50%
Macro-Economic Factors	50%
U.S. Dollar	25%
Inflation/Commodity Prices	10%
Monetary Policies	10%
Interest Rates	5%

Source: M. Murenbeeld and Associates, Inc.

Econometric studies indicate that the price of gold is determined by two sets of factors: “supply” and “macro-economic factors”.

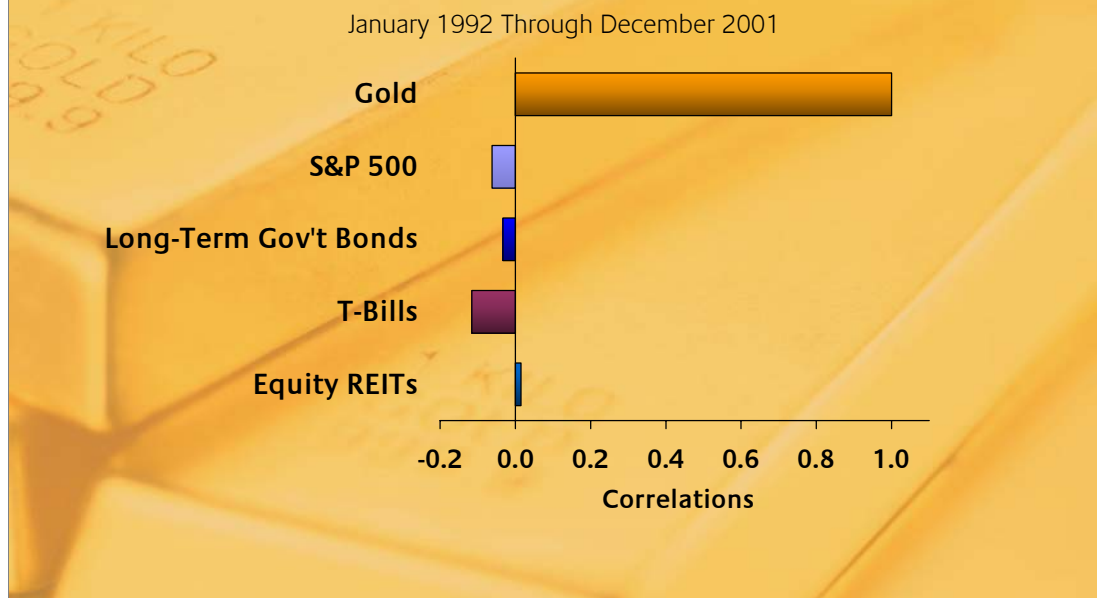
Supply and the gold price are inversely related. Besides new mining supply, the available supply of gold in the market is made up of three major “above-ground sources”. In recent years, the growth in gold supply has come from these “above-ground” sources.

- (1) reclaimed scrap, or gold reclaimed from jewelry and other industries such as electronics and dentistry;
- (2) official, or central-bank, sales
- (3) gold loans made to the market from official gold reserves for borrowing and lending purposes.

In the case of “macro-economic factors”, the U.S. dollar tends to be inversely related to gold, while inflation and gold tend to move in tandem with each other. Also, high low interest rates are generally a positive factor for gold.

Overall, the impact of all of these determinants on the gold price is judged to be neutral-to-positive at this time.

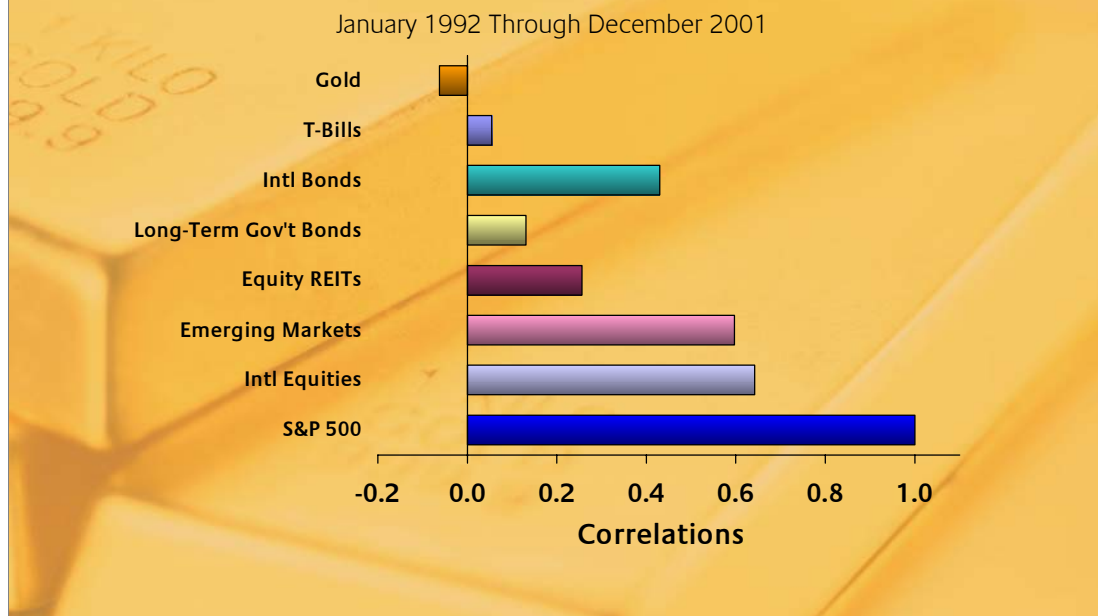
Gold Is Negatively-Correlated to Other Assets



This chart demonstrates why gold is such a helpful diversifier.

The bar charts above display the correlation between gold on the one hand, and various asset classes on the other. Gold is negatively correlated with most other asset classes. For example, whenever long-term bonds decline, there is a tendency for gold to go up. Whenever equities decline, there is an even greater tendency for gold to go up.

Gold Is Negatively-Correlated to U.S. Equities

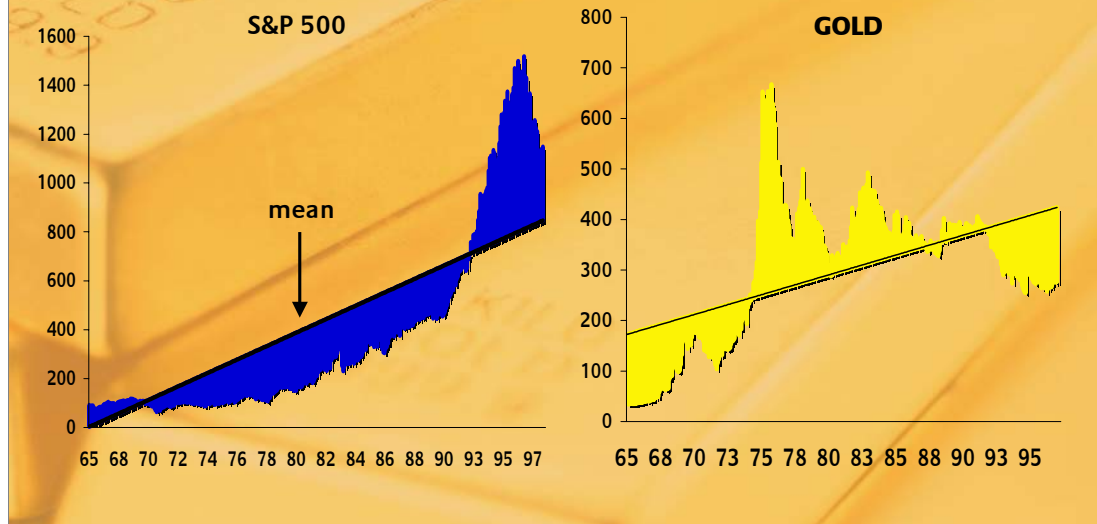


In this chart we can see that gold is more negatively correlated to U.S. stocks than any of the other asset classes that are typically used as portfolio diversifiers (such as bonds, emerging market equities, and REITS). This makes gold an especially effective diversifier for equity-oriented portfolios.

“Reversion to the Mean”

Will Equities Continue to Move Down to Their Mean... Will Gold Move Up?

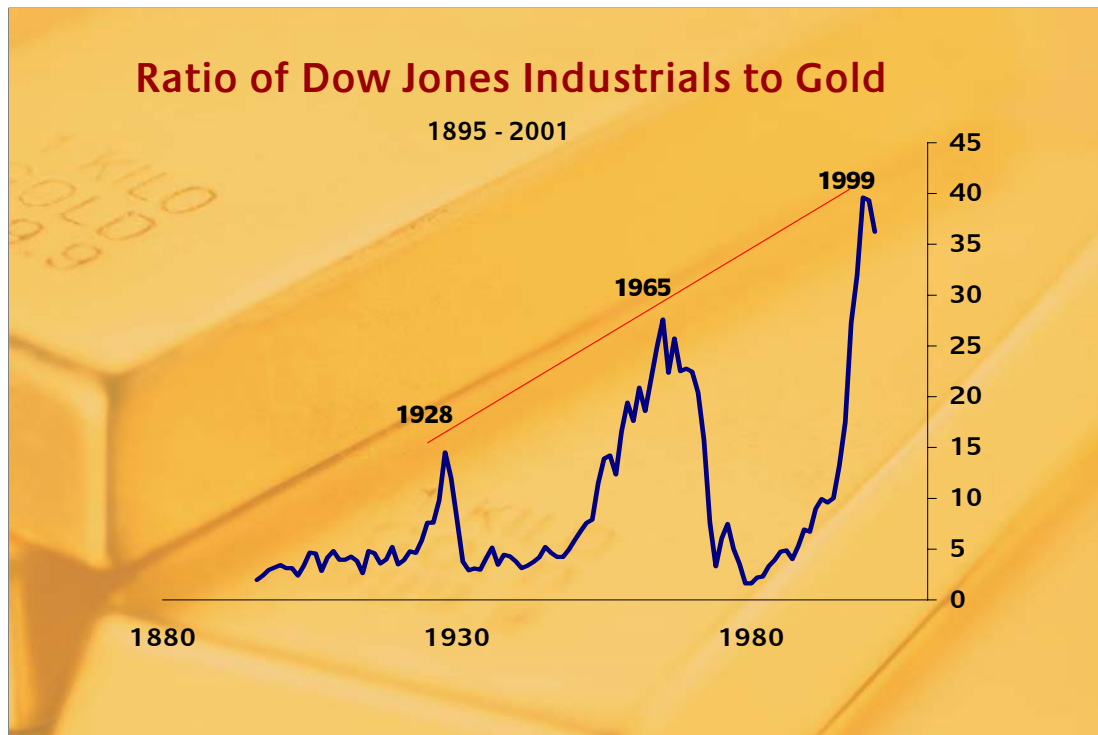
1970 - 2001



Let's examine the relationship between gold and equities a little further. Historically, the price of gold has generally moved in the opposite direction to equities. At certain points in history, the price of both equities and gold have “reverted to the mean”. During the recent years of strength in the stock market and weakness in the gold price, many portfolio managers have had reason to question what role, if any, gold can play in a portfolio's performance.

Yet consider...the stock market has been unusually high compared to its mean, as this chart illustrates, and the gold price has been unusually low compared to its mean. Therefore, the upside potential for the gold price is perceived to be greater than the downside potential.

Recently it appears the stock market has had some reversion to the mean. The key question is whether the market will continue to revert to the mean.



This chart displays the ratio of the Dow Jones Industrial Average to the gold price since 1885. The ratio of these investments have experienced marked peaks and valleys during major market cycles -- peaking once in 1928, a second time in 1965, and a third time in 1999. Since then the ratio has turned downwards. Again the question remains: will the ratio continue its decline?

Key dates:

- 1896 Time of financial turmoil, and speech by Williams Jennings Bryan on "Cross of Gold".
- 1932 Bottom of stock market cycle.
- 1980 End of inflationary boom, resulting in the erosion of the value of financial assets.

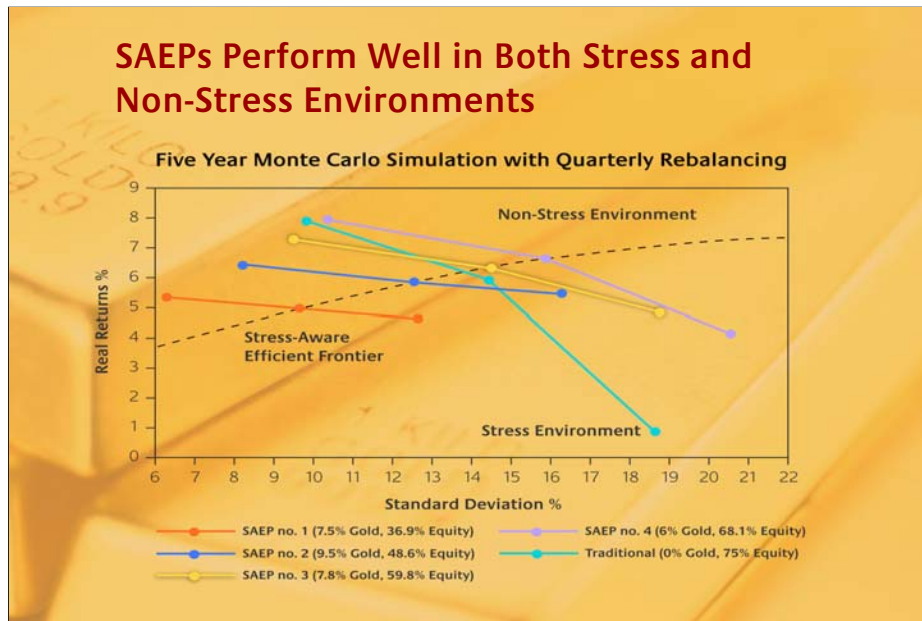
Traditional (Mean-Variance) Diversification Does Not Work When You Need It Most!

- ◆ During periods of financial stress, correlations and volatility of most assets increase rather than decline.
- ◆ New *stress-aware* methodology for portfolio optimization developed by Chow *et.al*/recognizes that stress periods do occur
- ◆ *Stress-Aware Efficient Portfolios* yield more consistent results during stress and non-stress periods

Most portfolio managers have traditionally used the “mean-variance optimization” method to determine the asset mixes for their portfolios. Unfortunately, many portfolio managers have been disappointed in recent years because their selected portfolios failed to perform as expected – especially during periods of financial “stress” (instability) such as in 2000 and 2001.

The failure to perform during these periods has led many observers to believe that diversification does not work when it is most needed. As pointed out by George Chow in the *Financial Analysts Journal*^{*}, this failure stems from the fact that correlations between asset classes tend to increase during periods of financial stress. In fact, this is precisely the time when the correlations should be decreasing in order to provide good diversification results.

^{*} May/June 1999 - *Optimal Portfolios in Good Times and Bad*



SAEPs produce more consistent results during stress and non-stress periods. In this chart, a portion of the Stress Aware Efficient Frontier curve (black dashed line) is represented. 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 occurring. Notably, gold appears in many portfolios along the efficient frontier, ranging from very conservative, low-risk portfolios (mainly bonds and T-bills) to aggressive, high-risk portfolios (mainly equities).

Next, Monte Carlo simulations of returns were conducted for 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 portfolios with risk exposures ranging from 9-16% (standard deviation) and expected annual returns of ranging from 4.5-7% are shown.

SAEP numbers 1-4 with a relatively conservative risk range have roughly similar returns in the 4-5% range during periods of *stress*. These portfolios contain gold holdings ranging from 6% to 10% and equity holdings ranging from 37% to 68%. Even more dramatic, a more traditional portfolio (with 75% equity, 20% fixed income, 5% cash) performs badly during the stress periods, with returns dropping to less than 1% .

On the other hand, in *non-stress* environments, the returns for SAEPs increase substantially as the portfolios move up the efficient frontier. The opportunity for increasing returns is greater than under stress conditions.

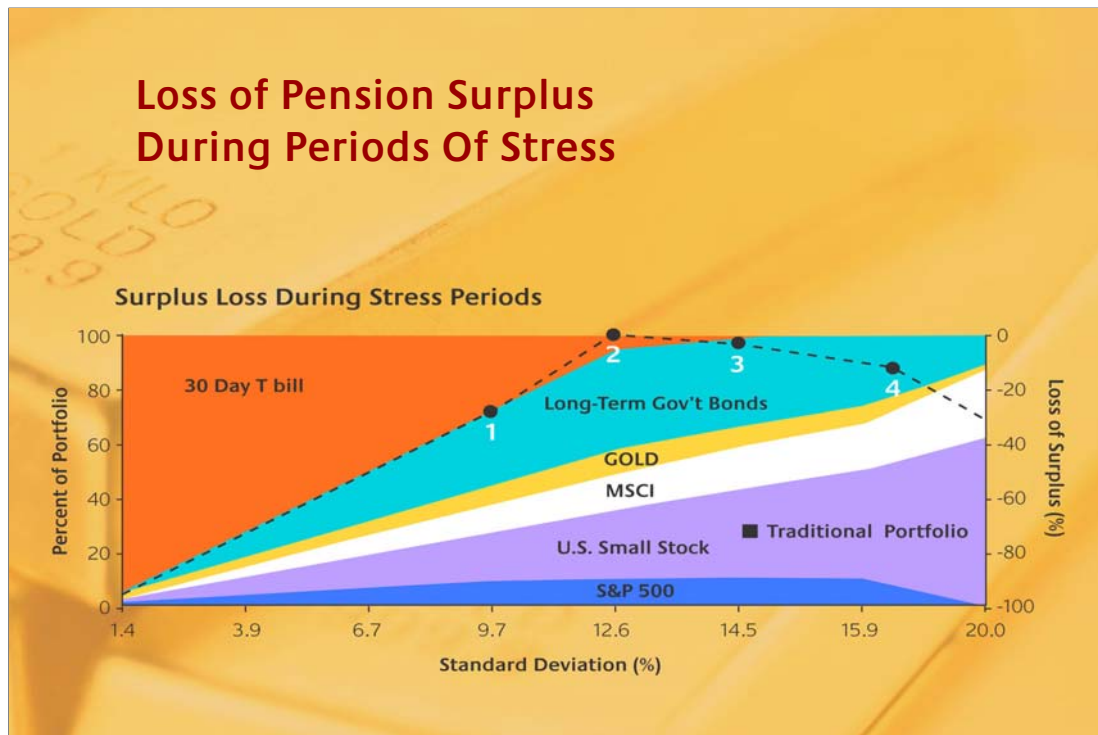
Compare, for example, SAEP no. 3 with the more traditional portfolio.

Stress-Aware Efficient Portfolio That Has Same Return and Less Risk

	Stess-Aware Efficient Portfolio (percent)	Traditional Portfolio (percent)
Gold	8	0
Foreign Equities	16.	20
Treasury Bills	0	5
Long-Term Gov't Bonds	32	20
U.S. Equities	<u>44</u>	<u>55</u>
	100%	100%
RISK	14.5%	14.5%
RETURN	6.3%	5.9%

The SAEP that has 8% gold and 60% equities, has higher expected returns at the same level of risk as a more traditional portfolio. It also has about the same returns during *non-stress* periods as does a more traditional portfolio, but over 3% better returns during *stress* periods. Therefore, the SAEP would be a superior portfolio to a more traditional portfolio.

Loss of Pension Surplus During Periods Of Stress

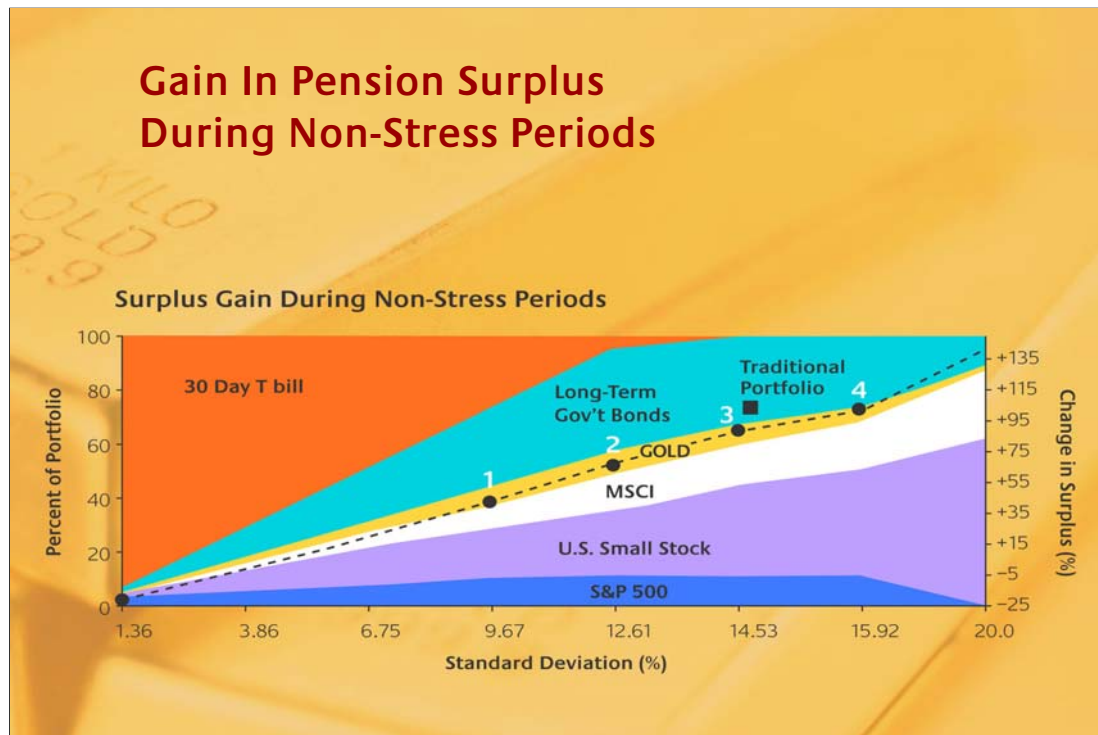


This chart shows the average change in surplus under “stress” conditions. The SAEPs preserve the surplus better than a more traditional portfolio by a substantial margin.

Consequently, it appears that SAEPs are superior to more traditional asset mixes. In this context, a more important question for plan sponsors to ponder is: how do the SAEPs affect a plan’s surplus during periods of stress? Another question: how do SAEPs enhance their fund’s surplus during periods of non-stress compared to a more traditional portfolio?

To determine if the SAEPs are superior to a more traditional portfolio for pension funds, the portfolios are evaluated for both stress and non-stress environments using a 5-year Monte Carlo simulation technique. The simulation assumed that the portfolios are rebalanced each quarter. The objective of the evaluations is 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.

Gain In Pension Surplus During Non-Stress Periods



Overall, the performance of SAEPs is clearly superior to a more traditional portfolio during periods of stress. However, the question arises: do SAEPs give up too much profit during non-stress periods?

This chart 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 more traditional portfolio. All of the portfolios record higher returns in non-stress periods. Not surprisingly, the degree of improvement is in proportion to the share of equities held in the portfolios.

While the more traditional portfolio might perform slightly better than SAEPs in a non-stress environment, it has been demonstrated that SAEPs perform better in stress environments.

Stress-Aware Efficient Portfolios with Gold: Key Advantages

- ◆ Perform more consistently in a wide variety of investment market environments
- ◆ Reduce or eliminate need to make forecasts of future market conditions
- ◆ Protect portfolios in bad markets
- ◆ Don't sacrifice portfolio gains in good markets
- ◆ Effective tool to manage pension surplus

Competitive With Conventional Diversifiers

- ◆ Bonds
- ◆ Treasury Bills
- ◆ Inflation-Indexed Bonds
- ◆ Real Estate

Highly Liquid

- ◆ International market
- ◆ Narrow bid/offer spreads
- ◆ Easily bought and sold
- ◆ More liquid than other alternative assets

Gold can be readily sold 24-hours a day in one or more markets around the world with narrow spreads. This cannot be said of most investments, including equities of the world's largest corporations. Gold is also more liquid than many alternative assets such as venture capital, real estate, and timberland.

Buying Gold

- ◆ Gold bullion available through major commercial banks and brokerage firms
- ◆ Purchase Options:
 - Physical Delivery
 - Storage
 - Storage plus leasing
- ◆ New gold-linked bonds available
- ◆ Gold investment permissible for pension funds under ERISA

Gold bullion is available through brokerage firms and banks throughout the U.S. Investors can choose the method of purchase and storage that best meets the particular institution's needs. Investors can take direct possession (physical delivery) or they can buy through a storage program. In the latter case, the broker, banker or dealer uses a secure, third-party depository to hold and protect the gold for a small fee.

With a storage account, the investor holds title to a specified amount of gold, which gives him/her the right to demand physical delivery at any time. With most storage accounts, the investor is allowed to buy and sell gold over the phone and receives a complete record of all transactions for tax and portfolio management purposes. Investors holding a minimum of 10,000 oz. of bullion also have the option of earning a modest return through leasing programs. Like other interest rates, gold lease rates vary based on market circumstances and the length of maturity of the financial instrument.

The world's largest bullion dealers and commercial banks are now issuing gold-linked bonds and structured notes to institutional investors. These instruments provide investors with the advantages of holding gold along with the ability to earn income from a bond.

CONCLUSION

Gold: Diversification That Works

- ◆ Reduces portfolio volatility
- ◆ SAEPs with gold perform consistently in stress and non-stress financial-market conditions
- ◆ Easy to buy; more liquid than other alternative assets