

A golden rule in risk management

Gold is a commodity that only loses its appeal when there are bull equity markets. **NIK BIENKOWSKI** argues that whether the market is hot or not, gold provides a steady influence on portfolio risk management.

Gold is a unique asset class and possibly the first asset class to exist. Gold has been a store of wealth, a currency and a commodity for thousands of years. Furthermore, there is a growing body of research which supports the notion that gold is a unique asset class and one that is independent of other asset classes and macroeconomic indicators such as GDP and inflation.

A number of studies overseas and one recent study by PricewaterhouseCoopers in Australia have all found that gold is insignificantly or negatively correlated with the major portfolio asset classes. The implications of these results suggest that an allocation to gold bullion may increase the efficient frontier, potentially resulting in higher returns for a given level of portfolio risk.

It is accepted practise in the finance industry that assets with low or negative correlation can decrease portfolio risk and expand the efficient frontier (see Markowitz). One of the main benefits from investing in gold bullion is that it is either negatively correlated or independent from other asset classes [(Harmston (1998), Smith (2001, 2002), Knox (2002)] or financial and macroeconomic measures [(Lawrence (2003), Knox (2002)]. Many alternative assets exist, perhaps with low correlation to the major asset classes. However, in contrast, gold bullion is highly liquid, fungible, easily stored and requires no management.

International research

The body of research studying the statistical benefits of holding gold bullion in a portfolio is slowly growing. The cornerstone piece of this research

was written in 1977 by Roy Jastram: *The Golden Constant—The English and American Experience 1560-1976*.

Jastram's book investigated price and purchasing power of gold over time and during different periods such as inflationary and deflationary times. He concluded that gold bullion has held its purchasing power parity with other commodities and intermediate products over the very long term. In this study, the use of commodities as a basis of comparison enabled construction of a long-dated index which represented a CPI-style index (CPI did not exist 400 years ago).

In 1998, Harmston updated Jastram's research, while also looking at the relationship between gold bullion and other asset classes. Harmston's study covered the US (from 1796), Britain (from 1596), France (from 1820), Germany (from 1873) and Japan (from 1880).

Harmston ran a series of regressions and showed that there was a positive relationship between the annual movements in bonds and T-bills with the annual movements in the Dow Jones Industrial Average Index (DJI) for the period 1968 to 1996. Over the same period, Harmston found that gold bullion had a negative relationship with the DJI.

As a result of the Jastram and Harmston studies becoming widely publicised, new research is gradually becoming available which supports the argument that gold is not related or negatively correlated with common portfolio constituents.

Until 2002, this research had focused on the US [(Smith (2001), Lawrence (2003)] and Europe and Japan [(Smith (2002)]. Although gold bullion is traded

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globally and is priced in \$US, it is likely that non-US investors will track the returns from gold bullion in their home currency unhedged. The Jastram and Smith studies show that gold bullion has negative or no correlation with domestic equities in other major currencies. The following examples (Table 1) using monthly closing prices support this conclusion.

Correlation coefficients are more appropriate for testing short-term or stationary processes. Smith (2001, 2002) also examined the existence of any long-term relationships with gold bullion as well as with a number of equity indices. He found that there was

no co-integration (long-term relationship) between gold prices and equity indices.

More recently, Colin Lawrence (2003) concluded that gold bullion was not only negatively or insignificantly correlated with equities, but that it was not related to macroeconomic variables such as GDP, inflation and interest rates. Using dynamic (vector auto regression) and static (correlation) approaches, gold was found to be one of two assets which was not related to any of the macroeconomic or financial measures tested. The other mainstream financial assets, as expected, were positively related to economic activity

(Table 2). Recent Australian-based research (Knox (2002)) also concluded that gold bullion was not significantly related to GDP, CPI, Australian equities and overseas equities.

These results establish a theoretical underpinning for the absence of a relationship between gold and other asset classes. In general terms, the demand for any commodity is driven primarily by exogenous variables such as GDP, and these changes in demand cannot immediately be matched by an increase in supply. However, gold has the unique characteristics of being homogenous and having large above-ground stocks relative to its flow which can meet changes in demand. Therefore the gold supply is highly elastic.

Australian research

While the international research shows that gold bullion is negatively or not related to the major asset classes, one might expect that this relationship could be different when examined in the Australian context. This is because the Australian dollar often moves in the same direction as the US dollar gold price (so when the US dollar gold price goes down, often the Australian dollar gold price goes up). Dr David Knox and PricewaterhouseCoopers Actuarial (2002) investigated the relationship of Australian-dollar-denominated gold bullion (\$AGold) with the major asset classes used by Australian superannuation funds between 1983 and 2002.

The period which Knox chose for his report dates back to the year in which the Australian dollar was floated. The report concluded that A\$Gold had negative or no correlation with Australian equities, as illustrated in Chart 1.

Since it is accepted that assets with negative correlation can expand the efficient frontier (i.e. increase return for little/no change in risk), Knox then examined the trade-off between risk and return resulting from the inclusion of A\$Gold in a 'benchmark' Australian portfolio. Knox's benchmark portfolio was based on the Australian Prudential Regulation Authority's (APRA) data of Total Superannuation Assets: 46% Aust. Equities, 20% Int'l Equities, 20% Fixed Interest, 6% Property and 8% Cash.

TABLE 1 GOLD BULLION'S CORRELATION WITH MAJOR MARKETS (IN LOCAL CURRENCY)

Country	Equity Index	Correlation Coefficient with Gold Bullion
United Kingdom	FTSE100	-0.0182
Germany	DAX100	-0.0378
France	CAC40	-0.0819

Source: Smith (2002)

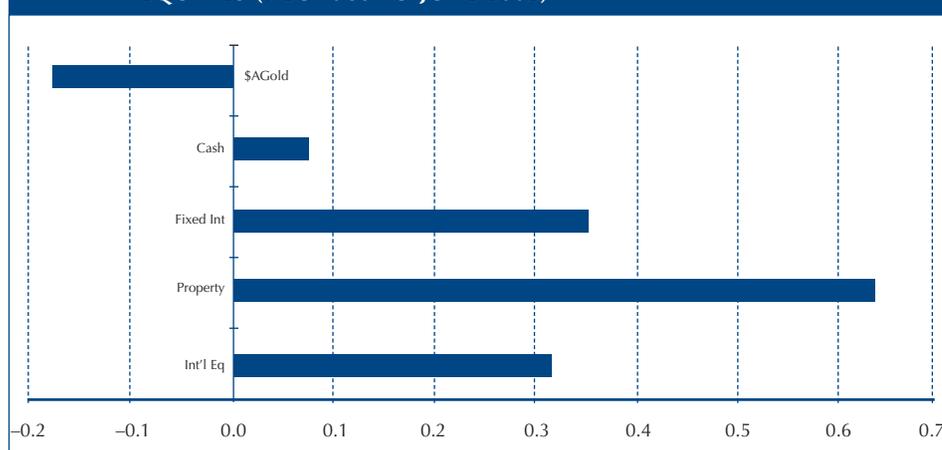
TABLE 2 CORRELATION OF FINANCIAL ASSETS WITH MAJOR MACROECONOMIC VARIABLES

Asset	Real GDP	Real interest rates	Inflation	Bonds
Gold	-0.13	-0.08	.011	0.01
S&P	-0.01	0.27**	-0.34**	-0.34**
Dow	-0.02	0.27**	-0.37**	0.33**
Bonds	-0.33**	0.42**	-0.54**	1.00**
Lead	0.20*	-0.12	0.00	-0.21*
Zinc	0.26**	0.05	0.06	-0.26**
Oil	0.03	0.09	0.49**	-0.32**

Shaded correlations were statistically significant at 0.01 (**) or 0.05 (*) significance level

Source: Lawrence (2003)

CHART 1 AVERAGE MONTHLY CORRELATIONS WITH AUSTRALIAN EQUITIES (DEC 1983 TO JUNE 2002)



Source: Knox (2002)

Table 3 shows the results of introducing a 5% allocation to gold bullion across different asset classes for the five-year period to June 2002.

The results from this table support Knox's finding that an exposure to gold over the period 1997 to 2002 would have placed a portfolio with some gold on the efficient frontier. For the previous five-year period a portfolio would have been placed on the efficient frontier if a decrease in risk, with corresponding lower return, was desired.

Gold outperforms in "stress" periods

The studies discussed above analysed the behaviour of gold over long and random periods and support the argument that an allocation to gold could have a positive effect on a portfolio's risk-return outcomes. Knox (2002) showed that for an Australian portfolio, an allocation to gold can reduce the probability of an extreme outcome. It is this "insurance" against extreme movements in traditional asset values which makes gold useful to have in a portfolio during periods of market turbulence.

Chow, Jacquier, Kritzman and Lowry (1999) investigated the relationship between movements in the major asset

classes and commodities during "stressful" and "non-stressful" periods. Chow et al show that the correlation between the major asset classes becomes more positive during "stressful" periods while the correlation of commodities with the major asset classes becomes more negative (see Table 4).

Chow et al define a "stressful" period as one where 25% of the observations fall outside a pre-specified range. It is not in the scope of this article to discuss this pre-specified range because their results are observed in eight dimensional space, i.e. eight asset classes are examined simultaneously!

The Chow et al study differentiates between the effect of these stressed and normal periods on the different asset classes because risk parameters are unstable (i.e. they constantly change). As a result, optimal portfolios based purely on static risk parameters or a "plain-vanilla", long-term focus may not be able to withstand certain short-term extreme periods.

Put simply, a portfolio designed for the long-term may not survive to generate long-term performance unless it can withstand all market conditions. It is during these extreme or negative market conditions where portfolio

managers are scrutinised more carefully by regulators and investors.

For example, a fund which underperforms its peers by 1% or 2% during the "good" years, when it is still returning 10% or 15% per annum, will not be scrutinised in the same manner in which an underperforming fund is scrutinised during the bad years when its peer group is returning -5% per annum.

Alternatively, a portfolio manager does not want to fall into the bottom quartile of funds simply because their fund could not withstand extreme markets. This can have a cannibalisation effect on the fund, as not only is the fund underperforming but an increase in redemptions will affect the viability of the fund's existence.

Gold is an alternative asset class

During these extreme times, when expected returns are low, capital preservation, rather than capital appreciation, becomes the main priority. As a result, portfolio investors will often seek alternative asset classes to stabilise and enhance portfolio performance.

Knox (2002) makes the following comments which suggest that gold bullion is also classed as an alternative (or "different") asset class: it has a low or negative correlation with all the major asset classes; it pays no income; it has experienced a low rate of return yet has a higher volatility than either cash or fixed interest; and it is subject to different forces of supply and demand from those which affect other asset classes.

Table 5, taken from UBS Pension Fund Indicators (2002), categorises precious metals (and thus gold) in the alternative asset class. The table compares the major alternative assets on a number of key investment criteria.

Strategic asset allocation

Asset allocation is not all theory— Australian investors held an allocation to gold in the past decade by simply holding a naïve or benchmark portfolio. This exposure to gold was obtained through gold equities listed on the Australian Stock Exchange (ASX).

Today, Australian-domiciled gold equities make up less than 1% of the

TABLE 3 BENCHMARK PORTFOLIO PLUS 5% ALLOCATION TO GOLD BULLION

Portfolio	1997–2002 Return	Std. dev.
Benchmark Portfolio	7.31%	8.11%
+ 5% gold across classes	7.28%	7.66%
+ 5% gold for Aust. equities	7.26%	7.40%
+ 5% gold for overseas equities	7.27%	7.55%
+ 5% gold for fixed interest	7.27%	7.97%
+ 5% gold for cash	7.34%	8.01%

Source: Knox (2002)

TABLE 4 PORTFOLIO CHARACTERISTICS DURING FULL/NORMAL AND STRESSED PERIODS

Sample	Standard Deviation	Correlation	Correlation of All Assets Excl. Commodities	Correlation of Commodities with All Other Assets
Full	11.67%	0.12	0.17	-0.03
Outlier	18.27%	0.14	0.23	-0.14

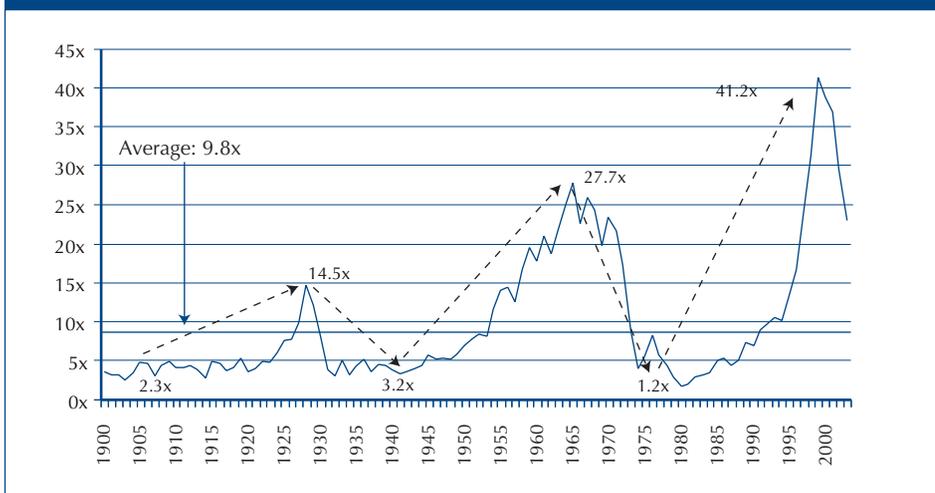
Source: Chow et al. (1999) *Financial Analysts Journal* (May/June), p. 69.

TABLE 5 PORTFOLIO CHARACTERISTICS OF VARIOUS ALTERNATIVE INVESTMENTS

Alternative Asset	Diversification Benefit	Risk	Liquidity	Holding/ Management Costs
Precious metals	v. high	low	high	low
Timber/forestry	high	mod.	low	high
Commodities	high	high	high	low
Art & collectibles	high	high	v.low	high
Hedge funds	varies	varies	low	high
Priv.Eq. buy-ins/outs	mod.	high	low	high

Source: UBS Pension Fund Indicators 2002—A longer-term perspective on pension fund investment

CHART 2 THE DOW-GOLD RATIO (1900 TO CURRENT)



ASX and therefore about 0.5% of a benchmark portfolio (assuming a 50% equity allocation). Although gold is one of the oldest asset classes to exist, if not the oldest, it is not unreasonable that gold has “fallen” out of the benchmark portfolio.

During the last 20 years, equities and other asset classes have experienced a bull market, while gold has underperformed. Despite gold’s recent underperformance, Chart 2 shows that both equities and gold went through extended periods (10 to 15 years) where one outperformed relative to the other. As a result, an asset should not be discarded just because it has been out of favour for a while.

The Dow-Gold Ratio is the Dow Jones Industrial Average Index divided by the \$US gold price.

Since it is difficult to predict (1) when gold will outperform equities, and (2)

when portfolio returns will experience extreme volatility, the case exists that gold bullion could form part of a benchmark portfolio. Both Knox (2002) and Chow et al (1999) examined different allocation ranges for gold/commodities in a benchmark/optimal portfolio.

Knox (2002) concluded that between 2.5% and 7.5% allocation to gold placed the benchmark portfolio on the efficient frontier and Chow et al (1999) concluded that a range of 3% to 12% was an optimal allocation to commodities (based on their results in the United States).

Combined, these results suggest that an Australian portfolio could benefit from an allocation to gold of about 5%. The specific allocation will obviously depend on each investor’s objectives and their view of the market and relative returns.

CONCLUSION

In a time where there is increasing concern regarding capital preservation, assets which are negatively correlated to the major asset classes and independent of macroeconomic measures should be seen as key portfolio constituents.

Gold bullion has been shown to hold these properties. In addition, gold bullion has preferred characteristics over other alternative assets which are becoming increasingly used as tools for risk management and differentiation in a low-return world. Gold bullion is liquid, low risk and easy to manage.

The above results suggest that gold is a tool which can be used to manage portfolio risk.

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*These are independent studies published by the World Gold Council available at www.gold.org