

UBS Investment Research

Weekly Weight Watcher

Gold's place in a portfolio

■ Strategic perspective

Interest in gold has increased this decade. High returns in recent years and diversification benefits—particularly during the tumult of the past twelve months—have attracted investor attention. In this issue, we assess the benefits of including gold in multi-asset portfolios.

■ Gold's track record

In fact, over the past four decades gold has produced sub-par risk-adjusted returns. However, gold's 'optimal' weighting in multi-asset portfolios varies considerably according to broader macroeconomic and financial conditions. Gold has provided the greatest portfolio benefits during episodes of duress—particularly during periods of high and rising inflation or high risk aversion. Gold has also done well during periods of sustained dollar weakness. In contrast, gold has under-performed during periods of relative macroeconomic and market stability.

■ Long-run allocations

Long run performance suggests a modest strategic weight of about 1% to gold in multi-asset portfolios.

■ Unchanged allocations

Tactically, we retain our existing recommended allocations—overweight credit fixed income and, to a lesser extent, government bonds and cyclical commodities. We retain neutral weightings to global equities and real estate, with a large underweight to cash.

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Gold's place in a portfolio

Over the past year, interest in precious metals—and in particular in gold—has increased. The reasons are not surprising. In the tumult of the past twelve months gold has held its value better than many assets. Moreover, this decade gold has performed strongly. Finally, interest in gold has spawned the development of exchange-traded gold funds and other vehicles that enable investors to gain exposure to gold at low cost, with improved liquidity, and without having to take physical delivery.

Below, we take a closer look at the merits of including gold in multi-asset portfolios. We examine gold's performance in terms of returns, volatility, and correlation to other liquid assets, such as stocks and bonds. We then assess gold's portfolio diversification properties, including over distinct sub-periods (such as high and low inflation, or high and low equity risk premium episodes) that shed light on gold's potential to add diversification when it is most desired.

We find that over the period during which gold prices have freely fluctuated (i.e., since the early 1970s) gold has produced sub-par risk-adjusted returns. That is mainly due to its high volatility. However, gold's 'optimal' weighting in multi-asset portfolios varies considerably according to the 'state' of the world. Gold has done best when inflation, risk aversion and/or interest rates were high (and rising), or when the dollar was trending lower. Gold has underperformed when economic and financial conditions were broadly stable. The evidence offers support, therefore, for the notion that gold's chief attribute may be to offer portfolio protection against 'tail risk'.

A brief history

Gold prices have been trending upwards for most of the past ten years, rising from around \$250 per ounce early this decade to a peak of just over \$1000 this year. Over the past twelve months, gold prices have remained broadly stable against the backdrop of heightened market turbulence and subsequent recovery. In short, gold has maintained its value over the past year despite—or perhaps because of—the volatility of markets.

Chart 1: Nominal and real gold prices



Source: Bloomberg, UBS Note: Real gold price deflated by US core CPI.

Renewed interest

Assessing when gold does best

A 'rainy day' investment

A good decade

Gold’s up-trend since 1999, however, masks its lacklustre performance in the preceding two decades, when gold significantly underperformed other liquid assets and even cash. Moreover, although spot gold prices are near their highest levels since the abolishment of fixed gold prices in 1971, real (i.e., inflation-adjusted) gold prices have yet to recoup their peak levels of early 1980s (Chart 1, preceding page).

Long under-performance

Gold in strategic asset allocation

To consider the merit of gold in multi asset portfolios, we first consider its relative return and risk characteristics, as well as cross-asset correlations. On those metrics, gold’s performance (measured since 1973) has been modest. Gold has returned around 7% per year since the early 1970s, under-performing other liquid asset classes, and marginally above average cash returns (Table 1). Moreover, lower returns have been accompanied by high volatility, producing a significantly lower Sharpe ratio (return/risk) for gold. On the other hand, negligible correlations to other assets make gold an attractive proposition, insofar as weak correlations are beneficial for portfolio diversification (Table 2).

‘Good as gold’ in a portfolio?
Modest returns, low correlations

Table 1: US asset class total return and risk summary, 1973-2009

	Equities	Government bonds	Corporate bonds	Real Estate	Precious metals	Cash
Return (p.a.)	9.0%	8.0%	8.2%	8.9%	7.0%	6.7%
Standard deviation (p.a.)	15.8%	7.2%	8.2%	19.0%	23.3%	1.0%
Return/risk	0.57	1.12	1.00	0.47	0.30	6.76

Source: UBS

Table 2: US asset class correlation matrix, 1973-2009

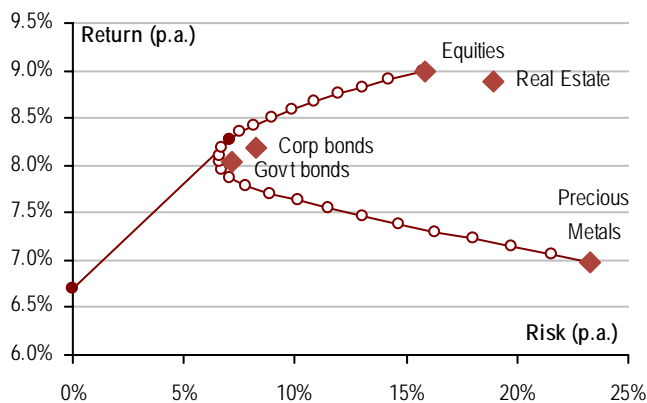
	Equities	Government bonds	Corporate bonds	Real Estate	Precious metals
Equities	1.00				
Govt bonds	0.15	1.00			
Corp bonds	0.34	0.73	1.00		
Real Estate	0.58	0.18	0.33	1.00	
Prec metals	0.03	0.00	-0.05	0.07	1.00

Source: UBS Note: Based on monthly total returns.

Gold’s high volatility has been a key detraction. As shown below, gold’s high risk profile has overwhelmed its beneficial correlation characteristics—optimal allocations over the past four decades would have been small. Gold has, in fact, behaved counter-intuitively. High risk (volatility) ought to be matched by higher returns, which has not been the case for gold since it was un-tethered from monetary and exchange rate policy in the early 1970s.

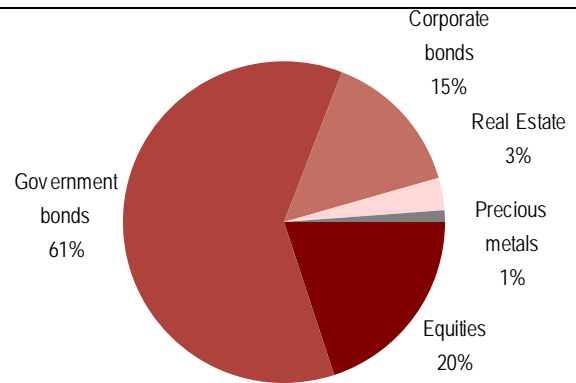
Very volatile prices

Chart 2: US assets efficient portfolio, 1973-2009



Source: UBS

Chart 3: US efficient portfolio asset weights, 1973-2009

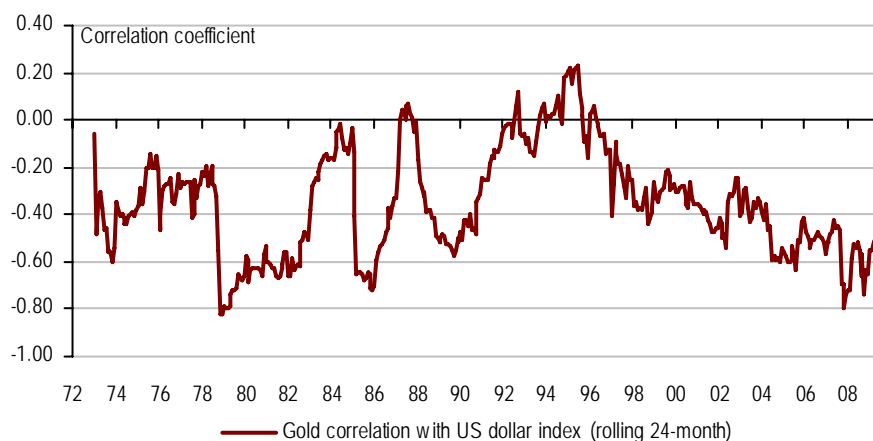


Source: UBS

As a result, despite its low correlations, gold’s ‘optimal’ allocation in a multi-asset portfolio over the past four decades has been around 1% (Chart 2 and Chart 3). However, that’s not the whole story. Gold’s usefulness in portfolios fluctuates according to the prevailing macroeconomic environment. In particular, gold has tended to out- or under-perform significantly depending on varying US dollar, inflation, or market risk scenarios.

But even here, it is worth noting that gold’s performance has varied considerably according to factors commonly cited as ‘explaining’ its returns. For example, gold’s correlation with the US dollar has not been stable, but instead has fluctuated considerably (Chart 4). The degree of correlation appears to reflect, in part, whether the dollar was *trending* (as opposed to merely rising or falling over shorter time horizons). In the late-1970s, mid-1980s, and over the past few years, for instance, the negative correlations were reasonably strong—all episodes of sustained dollar weakness.

Chart 4: Gold correlation with the US dollar index



Source: UBS

Low optimal allocation

A weak dollar trend has been gold’s friend

Correlations with other relevant macro variables fluctuate as well. The implication is that gold prices do not tend to respond to macroeconomic factors in a consistent fashion. That, in turn, makes modelling of gold prices difficult.

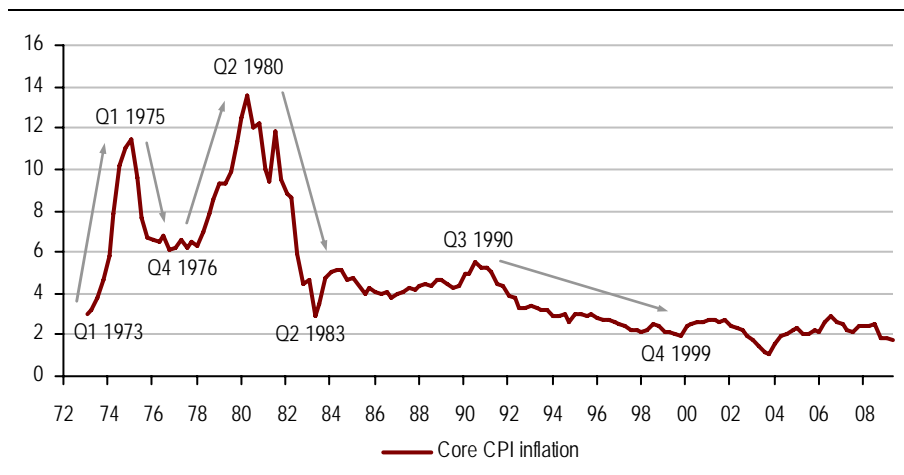
Still, as we show below, gold does exhibit some recurring patterns. And, in particular, gold appears to serve portfolio performance best during episodes of extremes—particularly in periods of heightened uncertainty about inflation, interest rates, or during periods of heightened risk aversion (as measured by the equity risk premium).

Gold and macro sub-periods

Inflation

Empirically, gold has been highly correlated with inflationary cycles. To be sure, the sample size is deficient—apart from the 1970s shock, inflation was mostly been trending lower over the past four decades (Chart 5). Still, there have been enough episodes of sharply rising and falling inflation to warrant an assessment of gold’s portfolio impact during those periods.¹

Chart 5: US core CPI inflation



Source: Bloomberg, UBS Note: Dates and arrows denote high/low inflation periods used in analyses.

As expected, gold’s performance during inflationary episodes has been strong, outweighing its high volatility. Consequently, optimal portfolios during those periods are wholly tilted towards gold (Chart 6 and Chart 7). As well, that’s a function of other asset returns being challenged in inflationary environments, posting lower returns than cash, on average.

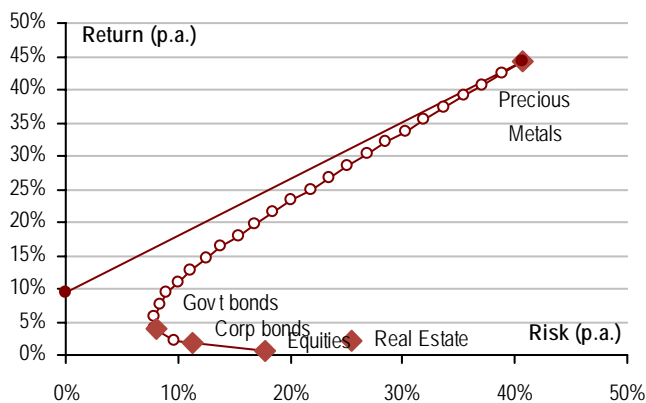
¹ In the following analyses, we first isolate sub-periods in which macroeconomic indicators (e.g., inflation or the US dollar) were rising and falling. Then, we create total return time series for each asset, treating the rising and falling periods as continuous scenarios. We use these return series in an unconstrained mean-variance optimizer to create efficient frontiers. Finally, we find the optimal portfolio for each macro scenario by extending the ‘capital market line’ from the cash return of the period to the tangent of the efficient frontier. ‘Precious metals’ is a total return index consisting of around 90% gold and 10% silver.

Unstable correlations

Gold has done well when inflation was high and rising

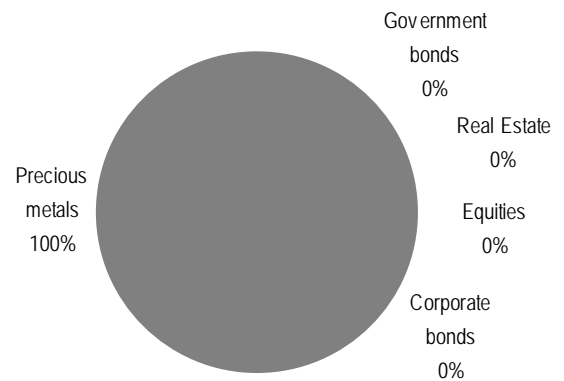
Gold wins in inflation

Chart 6: US assets efficient portfolio, high inflation periods



Source: UBS

Chart 7: US efficient portfolio weights, high inflation periods

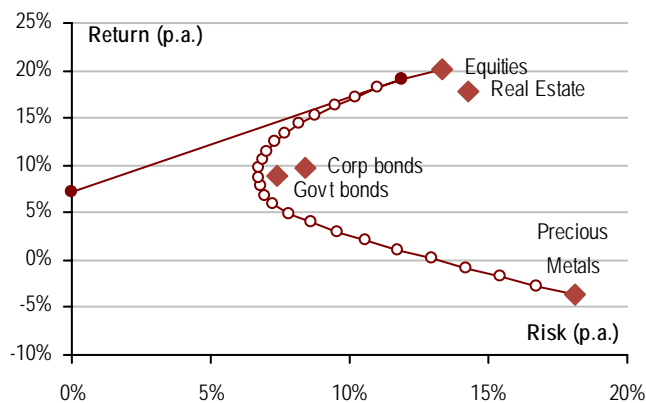


Source: UBS

In disinflationary environments, however, gold underperformed significantly. Long-term disinflation brought about lower interest rates, supporting fixed income performance. Also, falling interest rates and risk premiums provided a boost for risk assets like equities and REITs (Chart 8 and Chart 9).

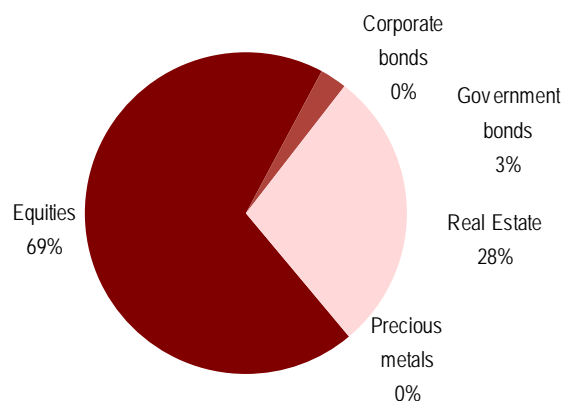
Disinflation favours other assets

Chart 8: US assets efficient portfolio, low inflation periods



Source: UBS

Chart 9: US efficient portfolio weights, low inflation periods



Source: UBS

Notably, the strong relationship between gold and inflation has broken down in recent years. As mentioned earlier, this decade gold has marched toward record highs spot prices against a backdrop of subdued inflation. In the past two years, extraordinary fiscal and monetary stimuli have been cited as possible catalysts behind gold's rally, prompted perhaps by concerns about higher inflation. However, inflation expectations have remained subdued, as evidenced by the inflation-linked bond market or surveys of inflation expectations. Although it may be possible that the variance of future inflation outcomes has increased and may be a factor behind rising gold prices, we suspect that gold's traditional rationale as an inflation hedge has not been the main driving force of late. Rather, dollar trends appear to have been more prominent.

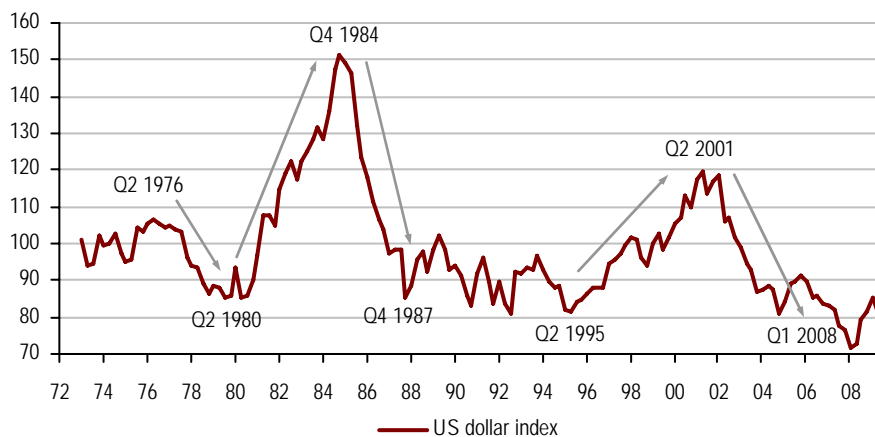
Broken relationship

US dollar

Over time, the US dollar has played a role in driving gold prices. Apart from the period of currency stability between the late-1980s and early-1990s, the dollar has experienced broad fluctuations since the early 1970s (Chart 10).

Broad fluctuations

Chart 10: US dollar index

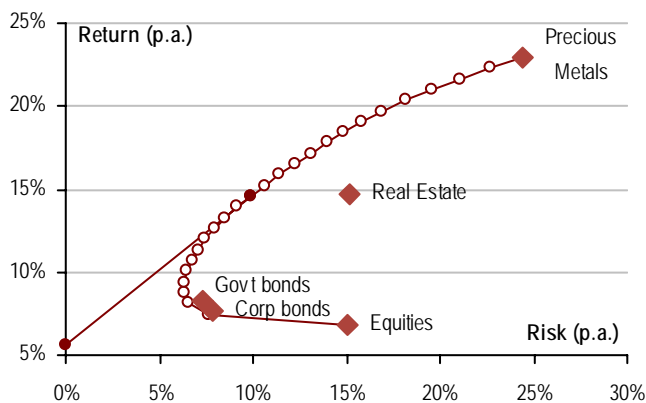


Source: Bloomberg, UBS Note: Dates and arrows denote weak/strong dollar periods used in analyses.

During weak dollar episodes, gold returns have tended to be far better than other assets, offsetting the precious metal's high volatility. As a result, optimal portfolios during those periods would have tended to be heavily weighted towards gold (Chart 11 and Chart 12).

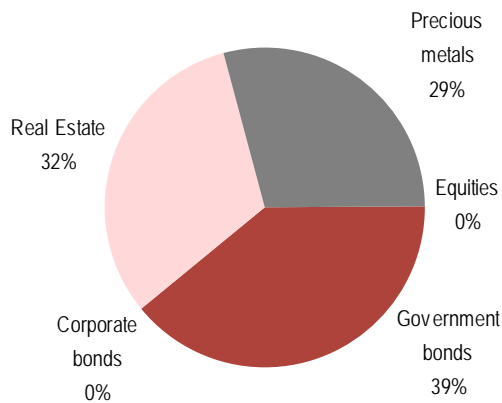
Weak dollar good for gold

Chart 11: US assets efficient portfolio, weak US dollar periods



Source: UBS

Chart 12: US efficient portfolio weights, weak US dollar periods

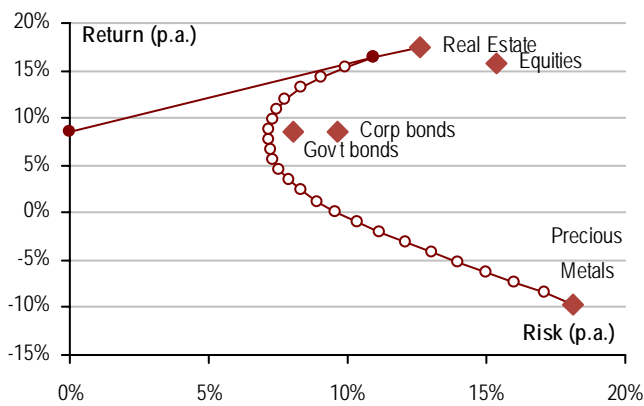


Source: UBS

Strong dollar regimes, on the other hand, have resulted in minimal gold holdings in optimal portfolios. Gold volatility remained high but, generally, gold prices fell when the dollar was weak (Chart 13 and Chart 14). Instead, optimal portfolios favoured assets such as REITs and equities during dollar weakness, but the reasons are not likely related to causal. More likely, dollar weakness simply coincided with periods of strong equity and REIT market performances.

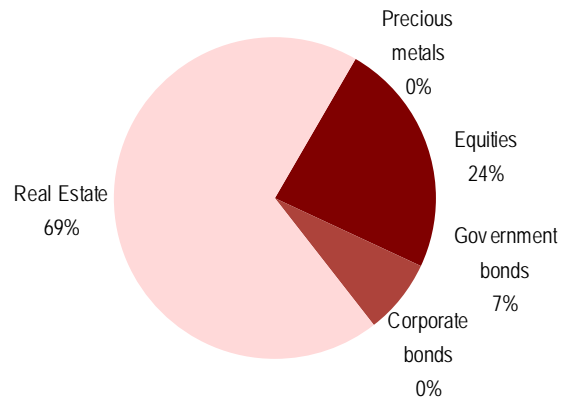
Gold underperforms when dollar rises

Chart 13: US assets efficient portfolio, strong US dollar periods



Source: UBS

Chart 14: US efficient portfolio weights, strong dollar periods



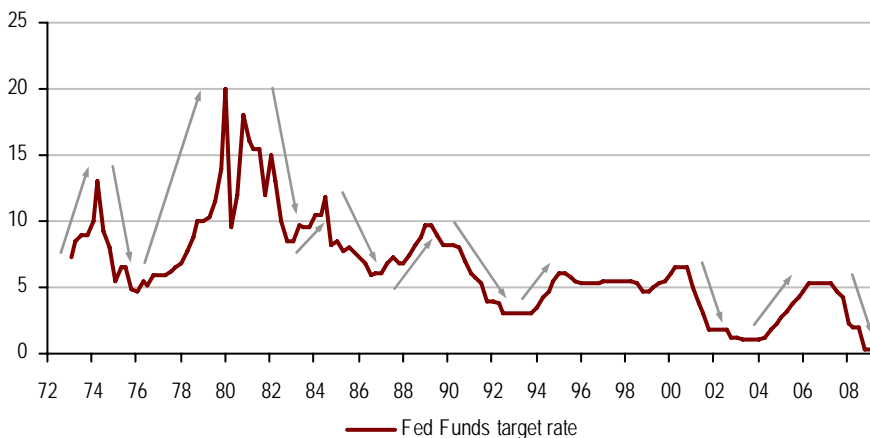
Source: UBS

As noted earlier, the strongest correlation between gold prices and the US dollar occurred when the US currency experienced distinct trends. Over the past decade, the correlation has been particularly strong as the dollar depreciated against a basket of major currencies. To be sure, other factors may have also played a role in gold’s strength throughout the past ten years (see, for example, equity risk premiums below). Nevertheless, a weak dollar/strong gold relationship has been consistent with patterns observed over since the 1970s.

Interest rates

Rising Fed funds rates have usually coincided with rising gold prices. Most likely, this was a result of interest rates being set in reference to inflation, and owes to gold’s high correlation with inflation (Chart 15).

Chart 15: Fed Funds target rate



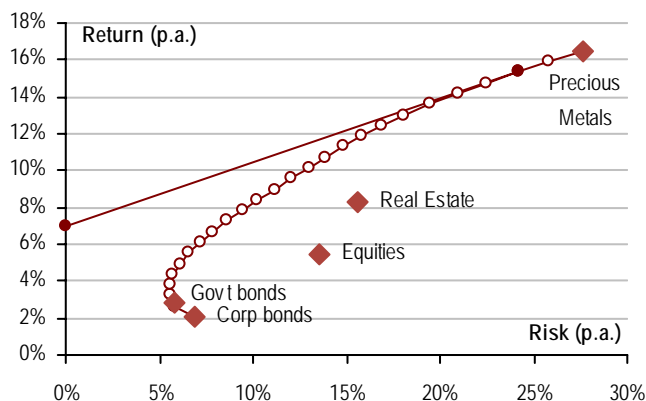
Source: Bloomberg, UBS Note: Arrows denote high/low interest rate periods used in analyses.

Thus, when interest rates were high (and rising) optimal portfolios were similar to ones during inflationary episodes—gold featured prominently (Chart 16 and Chart 17). And similar to the case of inflation, other asset returns were challenged, struggling to beat cash.

Interest rate-inflation link

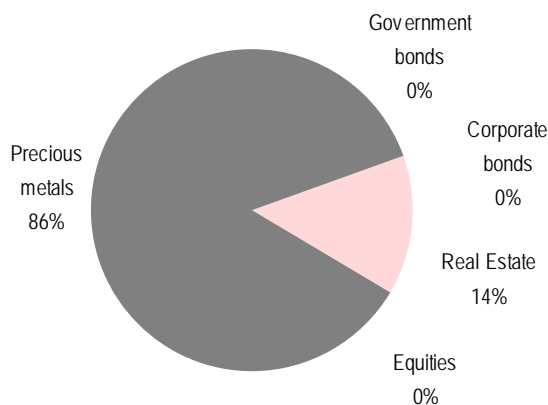
Similar to inflation portfolios

Chart 16: US efficient portfolio, high interest rate periods



Source: UBS

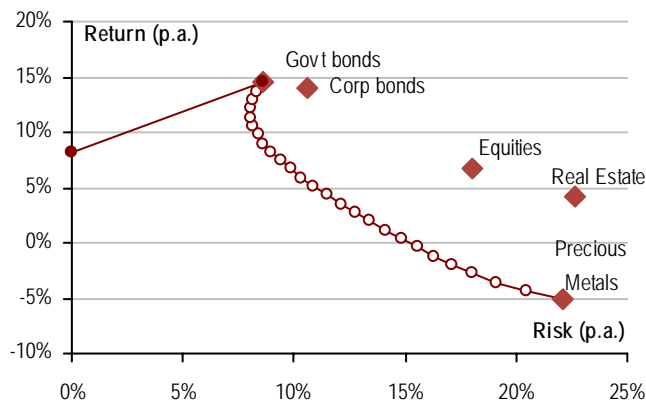
Chart 17: US efficient portfolio, high interest rate periods



Source: UBS

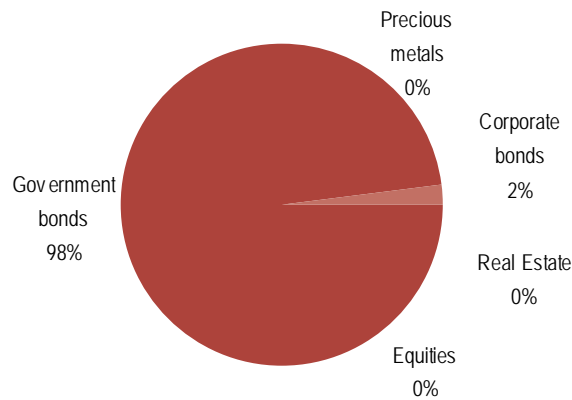
Conversely, falling interest rates usually accompanied easing inflation and, therefore, falling gold prices. Optimal gold weights were low during periods of lower interest rates (Chart 18 and Chart 19). Since government bond yields have a strong tendency to move alongside policy rates, their returns were high as inflation and short rates came down. As a result, bonds accounted for majority holdings in optimal portfolios during those periods.

Chart 18: US assets efficient portfolio, low interest rate periods



Source: UBS

Chart 19: US efficient portfolio, low interest rate periods



Source: UBS

As in the case of inflation, the relationship has broken down this decade. Near-record gold prices have accompanied extraordinarily low interest rates, particularly over the past year.

Equity risk premium

Another and strong influence on gold prices has been investor risk aversion. During times of heightened risk aversion, gold has appealed to investors as an attractive safe-haven asset, despite its historically high volatility. To gauge how gold has behaved during times of risk aversion, we create optimal portfolios during periods of rising and falling equity risk premiums. Our proxy for the equity risk premium is the earnings yield-real bond yield gap. A widening spread denotes rising equity risk premiums, while a narrowing spread suggests falling risk premiums (Chart 20).

Risk aversion and gold

Chart 20: US earnings yield less real bond yield

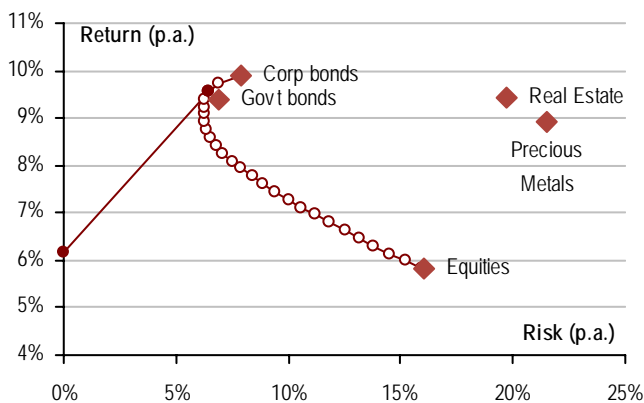


Source: Bloomberg, UBS Note: Arrows denote high/low equity risk premium periods used in analyses. We use 12-month trailing earnings yield less real bond yield as a proxy for ex-ante equity risk premium.

Rising risk premiums have tended to lead to higher gold weightings in optimal portfolios (Chart 21 and Chart 22). Importantly, gold’s relatively large allocation in the optimal portfolio, despite its low risk-adjusted return, implies that its low asset correlations are beneficial in episodes where investors have turned more cautious.

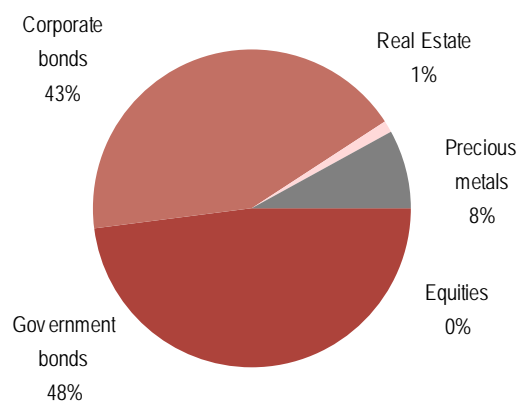
Correlations matter here

Chart 21: US efficient portfolio, high equity risk premium



Source: UBS

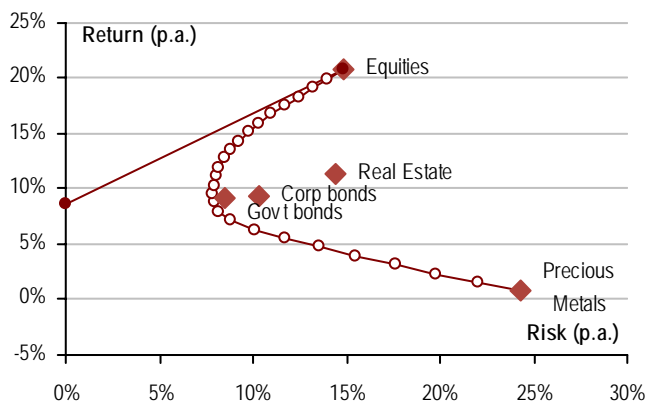
Chart 22: US efficient portfolio, high equity risk premium



Source: UBS

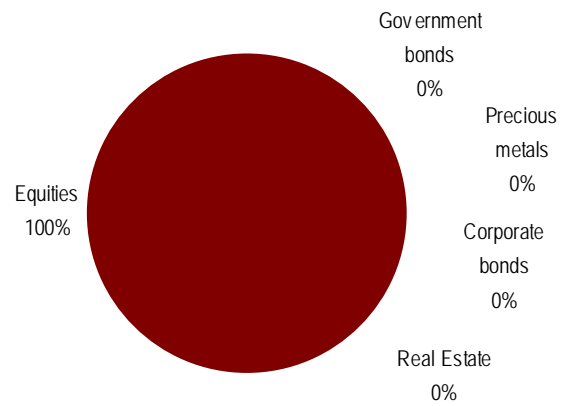
Conversely, periods of falling risk premiums would have led to minimal gold weightings (Chart 23 and Chart 24) in multi-asset portfolios. To be sure, the interpretation here is less clear. Because declining equity risk premiums almost always imply rising share prices, it’s of little surprise that optimal portfolios are fully weighted in equities, at the expense of all other assets. Nevertheless, gold’s performance during declining risk episodes has been the worst of all assets considered.

Chart 23: US efficient portfolio, low equity risk premium



Source: UBS

Chart 24: US efficient portfolio, low equity risk premium



Source: UBS

Conclusions

In sum, gold’s high volatility implies that it has been worthwhile to hold significant gold allocations only when returns are expected to be high or when the benefits of low correlation were most highly prized. Unsurprisingly, therefore, gold’s merits in a multi-asset portfolio have been contingent on prevailing macro conditions. We conclude as follows:

- Portfolio demand for gold is based on its return and correlation characteristics.
- Historically, long-term gold returns have been modest but volatility has been very high. Thus, gold has shown poor risk-adjusted returns over the period of freely fluctuating gold prices. Optimal allocations, on average, were low despite the benefits of its low cross-asset correlations. The optimal long-term gold weight has been around 1% of multi-asset portfolios.
- Gold has performed best when inflation, risk aversion and interest rates were rising and when the dollar was depreciating in trend fashion.
- Gold returns were poor when economic and financial conditions were broadly stable.
- Overall, one of gold’s main attributes is that it held its value best during periods of macroeconomic and market extremes. Accordingly, gold has offered diversification benefits when they were most coveted.

Gold does well when it is most needed

Asset allocation overview

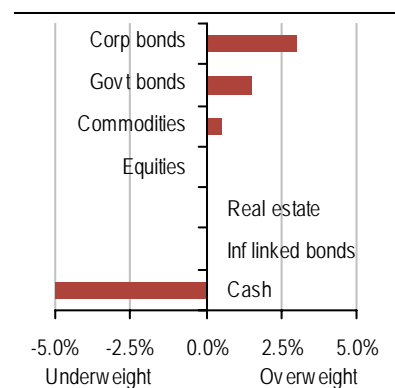
Table 3: Overview of global asset allocation recommendations

	Benchmark	Current	Previous*	Load (x)	Prev load (x')
Equities					
N. America	27.0%	25.5%	28.0%	0.94	1.04
Japan	4.5%	4.5%	4.5%	1.00	1.00
United Kingdom	5.0%	5.5%	4.5%	1.10	0.90
Europe	9.5%	10.5%	9.0%	1.11	0.95
Asia	3.0%	3.0%	3.0%	1.00	1.00
Rest of world	1.0%	1.0%	1.0%	1.00	1.00
Total equities	50.0%	50.0%	50.0%	1.00	1.00
Government					
United States	7.0%	8.5%	8.5%	1.21	1.21
Europe	9.0%	9.0%	9.0%	1.00	1.00
UK	2.0%	2.0%	2.0%	1.00	1.00
Japan	3.5%	3.5%	3.5%	1.00	1.00
Dollar bloc	1.0%	1.0%	1.0%	1.00	1.00
Total gov't bond	22.5%	24.0%	24.0%	1.07	1.07
Inflation indexed					
United States	1.0%	1.0%	1.0%	1.00	1.00
UK	1.0%	1.0%	1.0%	1.00	1.00
Europe	0.5%	0.5%	0.5%	1.00	1.00
Total infl. indexed	2.5%	2.5%	2.5%	1.00	1.00
Corporate bonds					
US inv. grade	6.0%	8.0%	8.0%	1.33	1.33
US high yield	1.5%	2.0%	2.0%	1.33	1.33
Euro inv. grade	2.0%	2.0%	2.0%	1.00	1.00
Sterling inv. grade	0.5%	1.0%	1.0%	2.00	2.00
Total corp. bonds	10.0%	13.0%	13.0%	1.30	1.30
Commodities					
Energy	1.0%	1.25%	1.25%	1.25	1.25
Industrial metals	1.0%	1.25%	1.25%	1.25	1.25
Precious metals	1.0%	1.0%	1.0%	1.00	1.00
Agriculture	1.0%	1.0%	1.0%	1.00	1.00
Livestock	1.0%	1.0%	1.0%	1.00	1.00
Total commodities	5.0%	5.5%	5.5%	1.10	1.10
Listed real estate					
United States	2.5%	2.5%	2.5%	1.00	1.00
Europe	0.5%	0.5%	0.5%	1.00	1.00
UK	0.5%	0.5%	0.5%	1.00	1.00
Japan	0.5%	0.5%	0.5%	1.00	1.00
Asia	1.0%	1.0%	1.0%	1.00	1.00
Total real estate	5.0%	5.0%	5.0%	1.00	1.00
Cash	5.0%	0.0%	0.0%	0.00	0.00

Source: UBS

Note: Load (x) = current weight / benchmark weight; * current as of 29 May 2009, previous as of 15 May 2009

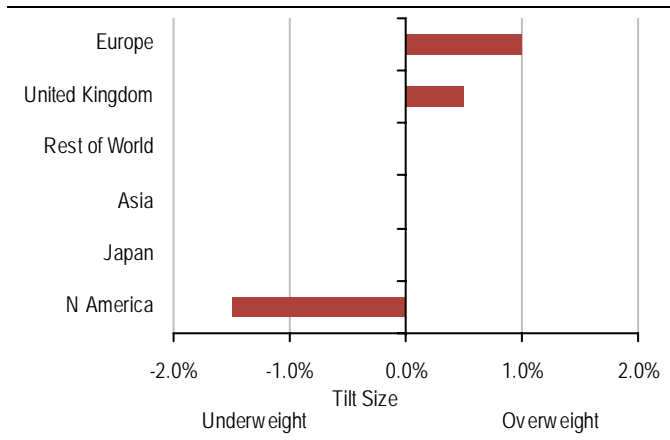
Chart 25: Asset class tilts



Source: UBS

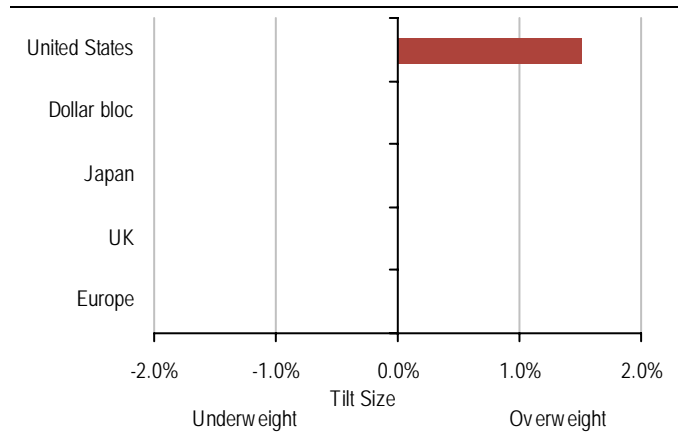
Asset class tilts by region

Chart 26: Equities



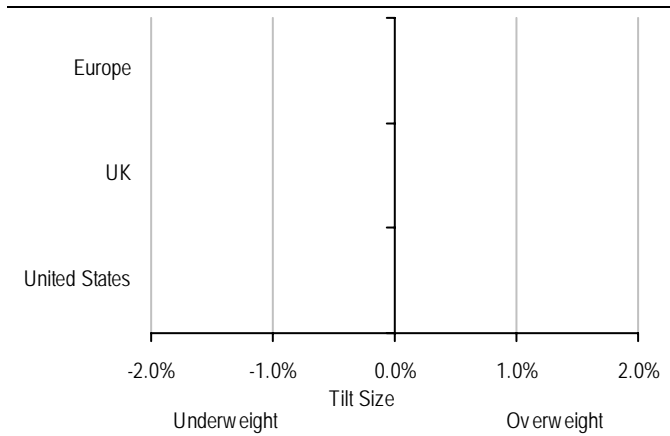
Source: UBS. Note: Calculated as current weight minus benchmark weight

Chart 27: Government bonds



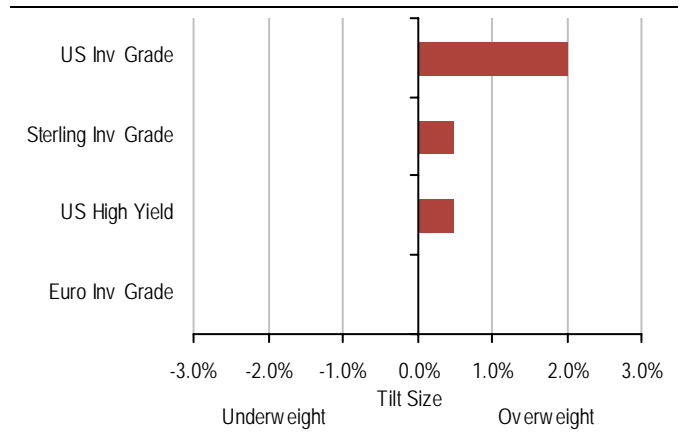
Source: UBS. Note: Calculated as current weight minus benchmark weight

Chart 28: Inflation-indexed bonds



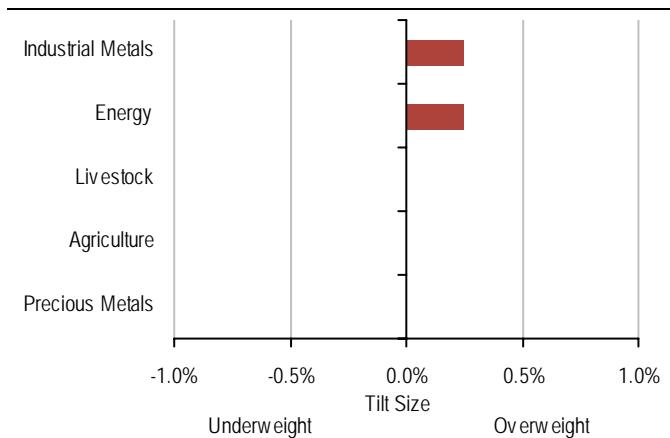
Source: UBS. Note: Calculated as current weight minus benchmark weight

Chart 29: Corporate bonds



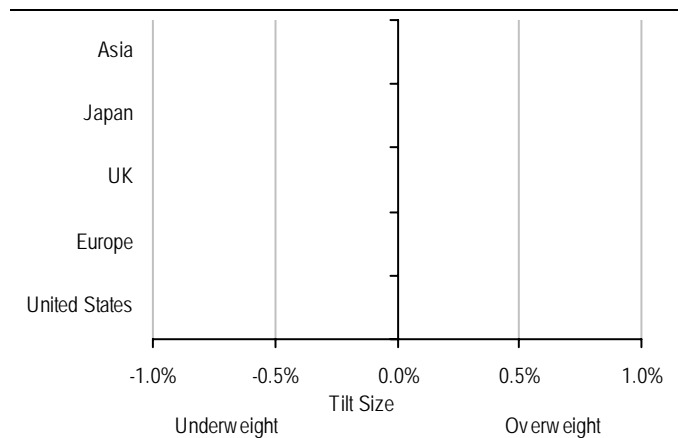
Source: UBS. Note: Calculated as current weight minus benchmark weight

Chart 30: Commodities



Source: UBS. Note: Calculated as current weight minus benchmark weight

Chart 31: Listed real estate



Source: UBS. Note: Calculated as current weight minus benchmark weight

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UBS 12-Month Rating	Rating Category	Coverage ¹	IB Services ²
Buy	Buy	44%	38%
Neutral	Hold/Neutral	39%	36%
Sell	Sell	17%	25%
UBS Short-Term Rating	Rating Category	Coverage ³	IB Services ⁴
Buy	Buy	less than 1%	33%
Sell	Sell	less than 1%	33%

1:Percentage of companies under coverage globally within the 12-month rating category.

2:Percentage of companies within the 12-month rating category for which investment banking (IB) services were provided within the past 12 months.

3:Percentage of companies under coverage globally within the Short-Term rating category.

4:Percentage of companies within the Short-Term rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS. Rating allocations are as of 30 June 2009.

UBS Investment Research: Global Equity Rating Definitions

UBS 12-Month Rating	Definition
Buy	FSR is > 6% above the MRA.
Neutral	FSR is between -6% and 6% of the MRA.
Sell	FSR is > 6% below the MRA.
UBS Short-Term Rating	Definition
Buy	Buy: Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.
Sell	Sell: Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.

KEY DEFINITIONS

Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.

Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (a proxy for, and not a forecast of, the equity risk premium).

Under Review (UR) Stocks may be flagged as UR by the analyst, indicating that the stock's price target and/or rating are subject to possible change in the near term, usually in response to an event that may affect the investment case or valuation.

Short-Term Ratings reflect the expected near-term (up to three months) performance of the stock and do not reflect any change in the fundamental view or investment case.

EXCEPTIONS AND SPECIAL CASES

UK and European Investment Fund ratings and definitions are: Buy: Positive on factors such as structure, management, performance record, discount; Neutral: Neutral on factors such as structure, management, performance record, discount; Sell: Negative on factors such as structure, management, performance record, discount.

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Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

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