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Gold: *Inflation Hedge and Long-Term Strategic Asset*

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An increasing number of investors are becoming wary about the outlook for price stability. What if central banks leave interest rates too low for too long or pump too much money into the economy? If they do, they risk making today s solution into tomorrow s problem: a sharp rise in inflation. If inflation does materialize, then traditional inflation hedges like gold, commodities, real estate, and inflation-linked bonds are likely to outperform other mainstream financial assets.

Gold has a long history as an inflation hedge. This relationship can be illustrated by contrasting the performance of the gold price during high inflation years with its performance in moderate and low inflation periods. In the eight years between 1974 and 2008 where U.S. inflation was high (defined as CPI inflation exceeding 5%), gold rose by an average of 14.9% in real terms, outperforming other assets such as bonds, equities, and even other commodities.

Still, some investors may be reluctant to add an asset intended to function primarily as an inflation hedge to their portfolio at this stage as there are currently equally compelling reasons for inflation to remain low. This leads us to ask whether any of the four traditional inflation hedges can demonstrably enhance investors risk-adjusted returns even in a low to moderate inflation environment yet still provide investors with the peace of mind that they have adequate inflation protection in their portfolio should inflation accelerate. Real returns are not, after all, the only means of assessing portfolio performance. The volatility of an asset s returns and its interaction with other assets are also important.

In the remainder of this article, we examine how gold has performed relative to the other three traditional inflation hedges on each count individually, then collectively using a portfolio optimizer. We will also examine whether a strategic case can be made for gold in the portfolio of an investor that already holds TIPS.

ASSET PERFORMANCE

The assets we chose to represent the four asset classes were: the spot price of gold (US$/oz) at 5pm in New York; the S&P GSCI, a production-weighted commodities index that is commonly used by institutional investors; the Bloomberg Real Estate Investment Trust Index (BB REITs), a capitalization-weighted index of Real Estate Investment Trusts having a market capitalization of US$15 million or greater; and Barclays Aggregate U.S. Treasury Inflation-Protected Securities Index (TIPS).

We chose three periods to compare the performance of these assets, given the lack of a uniform starting date for the series, namely: 1974 2009, 1993 2009, and 1997 2009. Prior to 1974 the movements in the gold price were still constrained by the existence of the

two-tier market following the U.S. closure of the gold window a few years earlier. BB REITs data became available in 1993, and the first TIPS were issued in 1997.

A Comparison of Real Returns

We began by comparing the inflation-adjusted or real returns of each asset over the respective time periods. In the first period, between January 1974 and May 2009, the nominal gold price rose by 658%, compared with a 997% rise in the S&P GSCI. In real terms, the gold price rose by an annualized 2.0%, while the S&P GSCI rose by 2.8%, as shown in Exhibit 1. Over the second period, gold posted an annualized real return of 3.6%, while the S&P GSCI rose by 2.1%. BB REITs were the worst performer, declining by an annualized 2.1% in real terms. In the final period, gold was the best performer, rising by an annualized 5.9% in real terms compared with a 0.2% decline in the S&P GSCI, a 3.8% decline in BB REITs and a 3.7% increase in TIPS.

Volatility

Using the same periods, we computed the annualized average volatility using real monthly returns for each of the series, shown in Exhibit 2. Not surprisingly, TIPS had the lowest volatility since inception, of 6.2% from March 1997 to April 2009. However, gold consistently delivered a lower average volatility throughout the three periods relative to the S&P GSCI and BB REITs. In the periods from 1993 and 1997 to date, gold s volatility was significantly lower, about 30%.

Exhibit 1

Annualized Real Returns (%)

Period	Gold	GSCI	REITs	U.S. TIPS
January 1974 May 2009	2.0	2.8		
December 1993 May 2009	3.6	2.1	-2.1	
March 1997 May 2009	5.9	-0.2	-3.8	3.7

Exhibit 2

Annualized Volatility (%)

Period	Gold	GSCI	REITs	U.S. TIPS
January 1974 May 2009	19.5	20.1		
December 1993 May 2009	14.7	23.0	21.4	
March 1997 May 2009	16.0	25.0	23.4	6.1

Note: Annualized volatility computed using monthly real returns over the corresponding period.

Portfolio Diversification

Of the four potential inflation hedges, gold proved to be the most effective portfolio diversifier against the assets held by a typical U.S. investor, although the S&P GSCI came a very close second. As illustrated in Exhibit 3, in the first period, neither gold nor the S&P GSCI showed a statistically significant correlation with any other major asset classes. The most noteworthy outcome from the second period was the poor performance of BB REITs as a diversifier. The index exhibited a correlation of over 0.4 with each of the equity indices (MSCI EM, MSCI World ex U.S. Index, and MSCI U.S.), as well as a strong relationship with high-yield bonds. Gold had the lowest correlation, an average of 0.14 with the other assets, while the S&P GSCI had an average correlation of 0.2. In the final period, which included TIPS, they were strongly correlated, almost 0.7, with U.S. Treasury and corporate bonds. But it was BB REITs that once again proved the worst diversifier, exhibiting an average correlation of 0.4 with the other assets, compared with 0.3 for TIPS. Gold and the S&P GSCI both showed an average correlation of 0.17 with the other assets.

Portfolio Optimization

The natural next step was to combine all three traits return, volatility, and diversification potential to examine whether the addition of any of the four potential inflation hedges enhanced an investor s overall risk-adjusted returns and, if so, what allocation of the asset was required to do so.

For each period, we computed the average monthly returns, volatility and correlations of the available assets as inputs into a portfolio optimizer. Looking at the historical performance, we used U.S. Treasury bonds, global corporate bonds, the MSCI U.S. Index, and the MSCI World ex U.S. Index as our benchmark basic portfolio. Then, using the Resampled Efficiency Optimization developed by Michaud and Michaud,[1] we constructed the expected efficient frontier produced by those four basic assets. We subsequently added gold to the mix and

Exhibit 3
Correlation of Monthly Real Returns on Gold (US$), S&P GSCI, BB REITs, and TIPS vs. Various Assets, March 1997 May 2009
Source: Bloomberg, Barclays, WGC calculations.

re-computed the frontier, then removed gold and added the S&P GSCI to produce a third efficient frontier. Similarly, when data permitted, we looked at the impact of including REITs and TIPS.

In two of the three historical scenarios, gold proved more effective than commodities, real estate and TIPS at achieving both the maximum reward-risk portfolio and the minimum-variance portfolio. The required allocation to gold in the portfolio mix to attain minimum variance ranged from 4.0 to 6.3%, while the allocation required to achieve the maximum reward-risk ranged from 7.0 to 9.9%. A summary of these allocations is shown in Exhibit 4.

Exhibit 4
Maximum Reward/Risk Minimum-Variance Portfolio

Period	Asset Required	Allocation Required to Achieve Maximum Reward/Risk Portfolio (%)	Allocation Required to Achieve Minimum-Variance Portfolio (%)
January 1974 May 2009	GSCI	6.9	9.4
December 1993 May 2009	Gold	7.0	6.3
March 1997 May 2009	Gold	9.9	4.0

Because historical returns may not be enough to assess the effectiveness of the proposed inflation hedges, we then conducted a portfolio optimization based on projected returns and historical monthly real returns from January 1990 to June 2008 to compute the covariance structure, using statistical techniques to adjust for the missing data in TIPS and BB REITS. We chose this period given the data restrictions on REITs and TIPS and the fact that statistical testing showed that this period was equivalent to the long-run correlation structure from 1974 to 2009 for the available assets, unlike the periods from 1993 2009 and 1997 2009, which were disproportionately influenced by the financial crisis.[2]

We made conservative expected real return projections for the four inflation-hedge assets to construct a

Exhibit 5
Annualized Market Forecasts

Asset	Real Return Projection (%)	Std Dev (%) January 90 June 08	Information Ratio
MSCI U.S.	8.00	13.9	0.576
MSCI ex-U.S.	8.00	14.7	0.544
U.S. Treasuries	4.50	5.0	0.900
Corporates	4.75	5.4	0.880
TIPS	4.00	4.9	0.816
Gold	2.00	13.0	0.154
GSCI	2.00	18.8	0.106
REITS	2.00	14.3	0.140

Note: The information ratio refers to a measure of risk-adjusted return, typically defined as expected active return divided by risk.

baseline scenario of low- to medium inflation. The inputs are shown in Exhibit 5. Were we to enter a period of high inflation, the real returns on each of the inflation hedges would likely be much higher, which an investor would need to take into consideration when deciding on an allocation.

Gold once again proved the asset more likely to help investors achieve the maximum reward-risk portfolio, based on a 6.9% allocation to gold. TIPS came a close second, and the S&P GSCI slightly behind. Including TIPS produced the minimum variance portfolio by switching out of Treasuries, but the risk-return structure was not as appealing, as TIPS are highly and positively correlated with Treasuries and corporate bonds and therefore do not offer the same diversification benefits as gold or commodities. BB REITs did not seem to enhance portfolio performance in any meaningful way. See Exhibits 6 and 7.

Finally, we ran a portfolio optimization for the case of an investor who already has an allocation to TIPS as an inflation hedge. We found that adding gold to such a portfolio is still beneficial, as the investor would take advantage of the diversification properties of gold to obtain lower potential variance and higher reward per unit of risk, as Exhibit 8 shows. The optimal allocation to gold in this case varies from 7.6% to 3.5% in the minimum variance and maximum reward/risk portfolio, respectively.

The question may arise on whether other precious metals, such as silver or platinum, individual commodities like oil, or alternative commodity indices, which could also serve as inflation hedges, may outperform versus gold as a portfolio diversifier. In particular, silver may be a considered an alternative to gold investment given their significant correlation. However, the short answer is no, and here are the reasons why: first, as Exhibit 9 shows, we find that gold delivers (equal or) better risk-adjusted returns than silver, platinum, oil, and even the Dow-Jones UBS Commodity Index (a production- and liquidity-weighted commodity index that has less exposure to energy than the S&P GSCI) over the 1993 2009 and 1997 2009 periods, where data for all these series were available. Second, while gold has an average correlation of 0.14 and 0.17 to the other assets in our basic portfolio during those historical periods, the average correlation of silver to those same assets is 0.18 and 0.22 over the same periods. For platinum we find an average correlation to the other assets in the portfolio of 0.20 and 0.24, respectively, and oil has an average correlation of 0.15 and 0.17. The average correlation of the DJ UBS Commodity Index is higher at 0.26 and 0.27.

Portfolio optimization combines risk-adjusted returns (in other words, returns per unit of risk) and correlations to other assets. Given that all these other commodities (or commodity indices) do not outperform versus gold in either of these characteristics, they will not reach the same level of optimality than gold does. One explanation is that other commodities tend to be more industrial based (including silver), and thus, they tend to have a higher correlation to other assets such as equities in economic downturns. The other explanation has to do with liquidity and depth of the market, which are qualities that tend to play in gold s favor.

Exhibit 6
Expected Efficient Frontier for a Basic Portfolio Before and After Adding Gold, Commodities, REITS, or TIPS
Exhibit 7
Annualized Market Forecasts

Asset	TIPS MinVar*	Gold MinVar*	Max Reward/Risk**
MSCI U.S.	6.20%	8.10%	10.40%
MSCI ex-U.S.	6.10%	3.80%	8.90%
U.S. Treasuries	38.50%	73.00%	64.50%
Corporates	1.00%	4.80%	9.30%
Gold		10.30%	9.90%
TIPS	48.10%		
Portfolio Return	4.60%	4.70%	5.10%
Portfolio Volatility	4.30%	4.40%	4.60%
Information Ratio***	1.05	1.07	1.11

*Notes:** *Portfolio mix that achieves the minimum expected volatility.*

** *Portfolio mix that gives the maximum expected return per unit of risk.*

*** *Portfolio return divided by portfolio volatility.*

Gold, however, does have a different tax treatment than equities, Treasuries, and other commodities, which are not considered collectibles (such as oil). On short-term investment, the tax rate for capital gains on gold holdings is the investor s marginal tax rate, which would be the same as with any other asset. On long-term investment, gold s capital gains are taxed at 28%, as opposed to 15%, which is the current rate for more traditional asset classes such as equities, fixed income, or many other alternative investments.

Investors wishing to buy gold or gain an exposure to movements in the gold price can chose between several different products. Perhaps the simplest route is to buy gold coins or bars. These vary in weight and in karatage (an indication of the gold content). The most common coin weights (in troy ounces of fine gold content) are 1/20, 1/10, 1/4, 1/2, and 1 ounce, while gold bars range in size from as little as 1 gram to 400 troy ounces (the size of the internationally traded London Good Delivery bar). Alternatively, investors can open a gold account with a bullion bank, where the bank will

Exhibit 8
Expected Efficient Frontier for a Basic Portfolio with TIPS and After Adding Gold
Exhibit 9
Average Annual Returns, Volatility and Risk-Adjusted Returns for Various Commodities and Commodity Indices

	Gold	Silver	Platinum	Oil	S&P GSCI	DJ UBS CI
Panel I: December 1993-May 2009						
Avg. annual return	3.6%	5.0%	4.9%	8.5%	2.1%	3.8%
Std. Deviation	14.7%	26.5%	21.7%	34.7%	23.0%	15.7%
Risk-adjusted returns	0.24	0.19	0.22	0.24	0.09	0.24
Panel II: February 1997-December 2009						
Avg. annual return	5.9%	6.7%	7.0%	3.9%	-0.2%	1.2%
Std. Deviation	16.0%	28.4%	23.6%	36.5%	25.0%	17.2%
Risk-adjusted returns	0.37	0.24	0.30	0.11	-0.01	0.07

buy and store gold on the investor s behalf. Bullion banks also sell a range of spot, forward, and structured gold products in the global over-the-counter market. The newest way to buy gold is via an exchange-traded fund. These offer investors the convenience of buying gold on the stock exchange as easily as they would any other share. There are several gold ETFs listed on stock exchanges around the globe.

One advantage ETFs have over gold coins and bars is their tax treatment under certain retirement funds such as 401(k)s and IRAs. Generally, gold coins and bars are classified as collectibles for tax purposes. In retirement funds, the amount invested in collectibles is usually considered a taxable distribution in the year the investment takes place and investors may have to pay an additional 10% tax in the event of an early distribution. This rule does

not apply to precious metal bullion investment products, which are defined as coins or bars meeting minimum exchange purity requirements for contract delivery (i.e., 99.5% purity for gold) but only if the bullion is in the physical possession of the plan trustee. The IRS has ruled, however, that some physical gold-backed ETFs, such as SPDR Gold Shares (GLD), are exempt from this rule and, thus, not treated as a collectible in qualified retirement accounts.

CONCLUSION

Gold has a role to play both as a tactical inflation hedge and as a long-term strategic asset. If the world economy experiences a resurgence in inflation, then gold, like the other traditional inflation hedges, is likely to outperform mainstream financial assets. Investors who are unsure whether to add a targeted, short-run inflation hedge to their portfolio at this stage should take solace from the fact that gold can be shown to enhance an investors risk-adjusted returns even in a low to medium inflation environment. The strategic case for gold rests mainly on its effectiveness as a portfolio diversifier. This reflects the unique and diverse drivers of gold demand and supply. In the periods considered, gold also consistently delivers a lower average volatility than either the S&P GSCI or BB REITs, something which may surprise readers, as gold is often erroneously perceived as an especially risky asset. The gold market is deep and liquid. Investors wishing to buy gold or gain an exposure to movements in the gold price can chose from an array of different products.

ENDNOTES

[1]Richard Michaud and Robert Michaud, *Efficient Asset Management: A Practical Guide to Stock Portfolio Optimization and Asset Allocation,* 2nd edition; Oxford Press: New York, 2008.

[2]We use the modified likelihood ratio test of equality of covariances (also known as the Box test) to verify the equivalence of the correlation structures in the described periods. All tests were performed at the 5% significance level.

SPDR® GOLD TRUST has filed a registration statement (including a prospectus) with the SEC for the offering to which this communication relates. Before you invest, you should read the prospectus in that registration statement and other documents the issuer has filed with the SEC for more complete information about the Trust and this offering. You may get these documents for free by visiting EDGAR on the SEC Web site at www.sec.gov. Alternatively, the Trust or any Authorized Participant will arrange to send you the prospectus if you request it by calling toll free at 1-866-320-4053 or contacting State Street Global Markets, LLC, One Lincoln Street, Attn: SPDR® Gold Shares, 30th Floor, Boston, MA 02111.