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Gold Stocks, the Gold Price and Market Timing

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ABSTRACT

We investigate the relationship between gold prices and gold equity index levels and consider whether this offers any explanatory power for the future returns of gold stocks. It is observed that a simple, well-specified model can explain movements in the stock prices of gold producing firms. Using evidence from gold exchange-traded funds we also show that investors' market timing decisions have reduced their average returns from these instruments by over 1.5% annually between 2005-2009.

The last decade has seen some very substantial volatility in the prices of commodities. Periods where oil traded over $100/barrel and gold traded at in excess of $1000/oz are two of the most widely noted cases. For equity investors, it can be challenging to identify suitable stocks in which to invest in order to benefit from the rising commodity prices. Gorton and Rouwenhorst (2006) note that in many cases it is difficult to match companies with commodities since very few are a "pure play". For example, an oil company may also produce natural gas whilst a silver miner can extract base metals at the same time as the precious metal. McDonald and Solnick (1977) and Blose and Shieh (1995) show that resource stocks are a leveraged play on the underlying commodity although the precise amount of this effect is less well defined (see Tufano, 1998). In contrast, Gorton and Rouwenhorst (2006) report that commodity stocks considerably underperformed a portfolio of "matching" commodity futures over a period of forty years. Furthermore the two groups have only weak positive correlation. The popularity of ‘Harvard’-style diversified portfolio investing has also encouraged further study of commodities as an asset class, (e.g. see Swensen, 2009) while ‘trend-following’ (or ‘momentum’) investment strategies are increasingly incorporating commodity futures or ETFs as an additional, 'diversifying' asset (e.g. see Faber, 2009). Further, mean-variance optimised and liability driven portfolio strategies often incorporate novel asset classes including commodities (see Bekkers et al, 2009).

The aim of this paper is to investigate the commodity-commodity stock relationship using evidence from the gold mining industry, which offers one of

the purer plays currently available to investors, and to assess whether this can be utilized to aid investment decisions. We find that a simple, well-specified model can be constructed to explain movements in gold indexes based on real interest rates and the relation between the underlying gold price and an index. Furthermore we observe that investors' market timing in trading gold exchange traded funds between 2005-09 has been detrimental to their returns compared to the expected average.

Gold Indexes vs the Gold Price as Investment Metrics

Throughout this paper we refer to two widely followed North American gold indexes; namely the Philadelphia Gold and Silver Index (hereafter XAU) and the NYSE Arca[1] Gold BUGS (Basket of Unhedged Gold Stocks) Index (hereafter HUI). The XAU index is a market-capitalization weighted index whilst the HUI is a modified equal dollar weighted index.[2] The XAU is one of the longer running gold indexes having been used since the introduction of options trading on the index in December 1983. In turn the gold/XAU ratio has become something of an investment tool for discerning when it may be appropriate to purchase gold equities.[3] Figure 1 demonstrates the behaviour of the gold/XAU ratio from 1983 to September 2009, along with the subsequent 1-year change in the index. As there is no total return index for the XAU, the right-hand y-axis reflects index point changes. It can be seen

[1] Formerly American Stock Exchange (AMEX).
[2] Price data for the indexes is collected from Thomson ONE Banker. Physical gold prices are closing prices from COMEX. Data for individual stocks are collected from Thomson ONE Banker and individual company reports.
[3] For examples see Abelson (2006) and Sergeant (2007).

that the ratio has tended to oscillate between 3.0 and 5.0 for much of the time frame. A high value of the metric suggests that gold equities are relatively undervalued compared to the physical metal whilst a relatively low ratio implies the reverse. Table 1 reinforces this notion with values of gold/XAU in excess of 4.5 having been associated with substantial index increases whereas ratios less than 3.5 have been associated with poor performance.

However, using this metric in a practical investment approach may be problematical, firstly due to the composition of the XAU index. Hamilton (2001) provides an explanation that at various times the XAU has not provided the proxy for exposure to gold price changes that might have been anticipated. For example, in 2001 the second largest component (15% of the index at the time) was Phelps Dodge, a firm that was primarily a copper company with only relatively small gold production. Also, a large portion of the XAU has historically been made up of companies that have hedged very significant amounts of their gold production for several years forward (Hamilton, 2001) and to this extent the exposure of the XAU to changes in gold prices has probably been dampened in the past. Jin and Jorion (2007) find no evidence that hedging increases gold mining firms' values, consistent with evidence presented by Jin and Jorion (2006) from the oil industry. Callahan (2002) reports that aggressive hedging does not maximise shareholder wealth. Indeed, there have been instances where gold producers have had such large hedge positions that a rise in the price of gold actually caused financial difficulties.[4] Tufano (1998) clearly demonstrates that the returns of North

[4] See "All Things to All Men", *Financial Times*, December 2nd 1999.

American gold producer stocks have a leveraged exposure to the gold price after controlling for reserves, production levels, hedging, etc[5]. Assuming that the gold/XAU ratio oscillates around a neutral level of 4.00 to 4.25 this implies that a 1% rise in the gold price equates to a 1% increase in stock prices.[6] During 1990-94, Tufano (1998) actually found the *gold beta* to be around 1.88. This further suggests the historical hedging activities of XAU constituent firms have suppressed the gold price exposure.[7]

In contrast, the HUI index was created in June 1996 such that only companies with no hedging in excess of 1½-years are considered for inclusion. As such, the profits of the constituent firms of this index should be much more closely correlated with the spot gold price. Figure 2 presents the physical gold price, the level of the HUI index and the HUI/gold ratio.[8] The leverage inherent in the unhedged gold stocks is clearly visible in the sharp decline in HUI/gold relative to gold alone during 1996-2000 as the metal fell from around $400 to under $300, the subsequent rise as gold approached $700 in mid-2007 and the large drop accompanying the financial crisis of 2008. As with the XAU, there is no accompanying total return index available, although since the end of 1999 NYSE Arca provides updates of the components of the HUI along with the relative weights of each company. We therefore create a new series which estimates the total return for the index on

[5] Faff and Hillier (2004) report that the factors affecting South African and Australian gold miners differ from those found by Tufano (1998) in North America.
[6] See Hamilton (2001).
[7] Evidence from *BNP Paribas Fortis Hedging and Financial Gold Report (2009)* suggests that hedging has declined markedly in recent years in response to the rising gold price with hedge books having fallen from 80 Moz in 2003 to 20 Moz in 2008.
[8] As in Hamilton (2004), it is conventionally used with gold as the denominator. This contrasts with the gold/XAU ratio.

a monthly basis using the dividends paid by the constituents. Since the dividends are generally relatively low or zero, we believe our data pre-1999 is a reasonable proxy for total HUI returns.

Gold Stocks and Sensitivity to the Gold Price

It has generally been accepted that commodity stocks offer a degree of leverage to the price of the commodity that they produce. In an informal survey of gold company managers, Tufano (1998) found that they expected a 1% increase in gold to lead to a 3% to 10% increase in their stock returns. This was considerably higher than the estimate of the gold beta of 1.88 observed by Tufano over the period 1990-94. During these years the gold price averaged around $360/oz and it was reported that a significant negative relationship existed between the sensitivity of gold share returns and the gold price, i.e. as the gold price rose so the gold beta declined. We estimate the market model as employed by Tufano (1998) for the returns on the HUI index using Equation 1:

$$R_{HUIt} = \alpha_i + \beta_{HUIg} R_{gt} + \beta_{HUIm} R_{mt} + \varepsilon_t \qquad \text{Equation 1}$$

where R_{HUIt} is the estimated return on the HUI index, R_{mt} is the monthly return on the S&P 500 and R_{gt} is the monthly return on the gold price.[9] The coefficient β_{HUIg} is the gold beta or an estimate of the sensitivity of the HUI's

[9] We ignore gold lease rates as Tufano (1998) finds that these make little difference to the overall return.

returns to a 1% change in the price of gold after controlling for broad changes in the overall equity market. Gold betas can vary quite considerably over short periods and, as we are interested in longer-term trends, we use a longer period for calculating these than Tufano (1998). Figure 3 shows the results of a monthly calculation of the gold beta using all of the data available each month beginning in June 1996 and a 4-year rolling beta value, along with the price of gold. It can be seen that the gold beta peaked around the end of 2002, a little after the bottom in the physical market. Given that this is a rolling multi-year value, this is consistent with prior evidence of the inverse relationship. From 2003, the gold beta has generally declined as the gold price has ascended. The low point in 2007-08 was around 1.5, however, this has subsequently risen as the extreme volatility surrounding the financial crisis has fed into the gold beta. In general, we find evidence to support Tufano's (1998) observation that the gold beta is lower than perhaps expected.

Explaining Gold Index (HUI) Returns

We now consider the effectiveness of using the HUI/gold ratio along with an additional variant to explain subsequent HUI returns. The two measures we employ are the standard ratio and a ratio that includes a fixed leverage to the gold price. For the fixed leverage ratio we assume that the sensitivity to gold prices is maintained at 1.88 based on Tufano's (1998) estimate (denoted as $HUI/gold^{1.88}$) which effectively creates a ratio that, if correct, should oscillate

around a fairly constant average value in the same way that gold/XAU appears to have historically behaved.

Table 2 reports the results of regressions estimated during the period from June 1996 to September 2009 using subsequent annual returns as the dependent variable and the gold-HUI measures as the independent variables. The signs of the HUI-gold coefficients are as anticipated; HUI/gold and $HUI/gold^{1.88}$ are both negative indicating that returns are lower when stocks are relatively expensive compared to the physical metal. Both terms are also statistically significant, although the adjusted-R^2 values are not especially high.

Real Interest Rates and Gold

We now consider whether the introduction of the real interest rate can improve the explanatory power. Barsky and Summers (1988) observe that in the US between 1973 (when the gold market became free of government operations and "genuine" market price was reached) and 1984 (when their study ended), there was a highly significant negative relationship between the real interest rate and the price of gold. They argue that the willingness of investors to hold gold varies according to the anticipated real returns for other assets. Figure 4 displays how this relationship has developed in the years after 1984 (with real rates calculated as the difference between 1-year T-Bills and CPI). It is noticeable how the large rises in the gold price in the periods of 1975-1980 and 2001-2007 have both been accompanied by periods of

negative real rates, whilst the 20-year decline from the 1980 peak coincided with a period of tight monetary policy. It is also of interest to observe how real rates have affected subsequent gold price movements. Table 3 reports regressions (for the period December 1975 to September 2009) for the annual *subsequent* change in gold prices explained by real interest rates.[10] For the whole period it can be seen that a significant negative relationship exists between real rates and movements in the gold price. When sub-periods are used, the negative relationship still holds throughout although it loses its statistical significance during the period of 1975-1995.

A potential problem of the approach using gold-HUI metrics to determine allocations to gold equities is that whilst the stocks might be relatively cheap compared to the metal, if the metal itself is expensive and then declines in price then intuitively it seems unlikely that the equities will be good investments. To this extent it seems logical that the inclusion of a variable in the model that has some ability to explain the change in the gold price itself would be a valuable addition. Table 4 presents the results when the real interest rate is introduced as an additional explanatory variable in the equations used in Table 2 for estimating subsequent HUI returns. Firstly, it is noticeable that the explanatory power of all the equations increases substantially and that real rates alone explain over 27% of the variation in HUI returns. The coefficient has the anticipated negative sign consistent with that observed earlier in regressions explaining gold prices. Introducing the real rate does not affect the sign on the coefficients of the gold-HUI metrics.

[10] The Newey-West (1987) correction is applied.

Clearly these results have benefited from the relationship between real rates and gold prices being strongest during the period under consideration (Table 3 shows that the real rate-subsequent gold price relationship was strongest during 1995-2009); however it still provides considerable support for real interest rates being an important factor in explaining gold equity returns.

Forecasting Gold Index (HUI) Returns

The regressions run so far are all within sample and thus are perhaps not the most objective measure of the effectiveness of gold-HUI relationships for tactical asset allocation. To examine the strategic value of the metrics we consider using a trading rule base on the regression models in Table 2 and compare these with a buy-and-hold approach. For each of the regression methods, forecasts of annual HUI returns are generated beginning after 60 months of observations being available. Both a recursive approach, using all available data, and a rolling approach, using the most recent 60-months of data, are tested. Each month's forecast is compared with the current return available on cash, as defined by the 3-month T-Bill rate. If the forecast is in excess of the cash yield then a long position is taken in the HUI index, if not then a position in cash is taken instead. The buy-and-hold approach simply involves holding a long HUI position throughout the whole sample period.

Results are reported both excluding any penalties for switching asset classes and also with a transaction cost of 0.5%, to reflect brokerage fees, dealing spreads and order slippage; on each occasion a move into or out of

the HUI occurs after the initial allocation (this is accounted for when making the switching decision based on the regression forecasts). The inclusion of transaction fees reflects that some methods will involve a greater degree of trading and that this is not a costless exercise. It is accepted that the period over which this strategy is tested is relatively short but this is an inevitable consequence of the equally short existence of the HUI index. Nevertheless, it does serve as an illustrative demonstration of a trading approach to seek to take advantage of the relationship between the prices of gold stocks and the metal itself.

Table 5 reports the results of the different trading approaches. Panel A displays the returns attributable to the two different gold-HUI variants, both recursive and rolling. In both cases the rolling forecast provides a higher return than the recursive. It is not clear, however, that one gold/HUI variable is superior to the other. The slightly unexpected result of the HUI/GOLD recursive forecast with transaction costs having a higher return than the same model without transactions costs is due to the friction of the costs actually avoiding, with the benefit of hindsight, an unsuccessful asset allocation switch.

Panel B shows the results of using the regression equations that incorporate the real rate to generate forecasts. Firstly, the performance of the trading strategies of the gold-HUI metrics combined with real interest rates is generally much improved compared to the results in Panel A (with the exception of the HUI/GOLD rolling forecast). We also note that the real rate alone provides fairly good forecasts. Finally, Panel C reports the results of a

buy-and-hold approach. This is clearly the most successful of all the results with both the highest compound annual return and Sharpe ratio. Only one gold-HUI model came within 1% of the compound annual return of the buy-and-hold method. It should be noted though that for much of the period of study gold stocks were in a bull market and thus forecasting may be more useful in periods where prices demonstrate more variability.

Gold Exchange-Traded Funds and Investor Timing

The last decade has witnessed a substantial increase in investor demand for exchange-traded funds. As an example, the *Financial Times*[11] reports that ETF assets under management rose from less than $100bn in 1999 to over $1trn in 2009. One of the biggest successes has been the creation of physically-backed ETFs to track the price of gold. The SPDR Gold Trust (GLD) held $1.3bn (3.05Moz of gold) in assets at the end of 2004, which increased to $35.1bn (35.2Moz of gold) at the end of September 2009. This now represents one of the largest ETFs globally. Over the same period, the UK-listed Gold Bullion Securities (GBS) ETF has increased from around $700m in assets to $4.2bn. One of the interesting aspects of these instruments is that they provide daily information on the number of shares in issue which fluctuates according to the creation and redemption of units.[12] This can be used to estimate the cash inflow/outflows over a particular period of time and thus to gauge investors' market timing abilities.

[11] ETF supplement in 1st February 2010 edition.
[12] For GLD data see www.spdrgoldshares.com and for GBS data see www.etfsecurities.com.

Friesen and Sapp (2007) examine the timing ability of mutual fund investors using cash flow data at the individual fund level for the period 1991-2004. They observe that timing decisions reduce the average return by around 1.6% annually. We apply the methodology of Friesen and Sapp (2007) to the two gold ETFs described above to study investors' market timing ability with these instruments. This is achieved by comparing the geometric monthly average return, r^g, with the money-weighted average monthly return, r^{mw}, over the same period. The money-weighted average is defined as the rate of return at which the accumulated value of the initial total net asset value plus the accumulated value of net cash flows equals the total net asset value at the end of the period in question.

$$r_j^{mw}: TNA_0\left(1 + r_j^{mw}\right) + \sum_{t=1}^{T} NCF_t\left(1 + r_j^{mw}\right)^{(T-t)} = TNA_T \qquad \text{Equation 2}$$

where,

$$NCF_{j,t} = TNA_{j,t} \quad TNA_{j,t-1}(1 \mid r_{j,t}) \qquad \text{Equation 3}$$

and $NCF_{j,t}$ denotes the monthly net cash flow for ETF *j* in month *t*, and $TNA_{j,t}$ is the total ETF capitalization for ETF *j* at the end of month *t*.

Initially, we follow the method of Friesen and Sapp (2007) by using end of month data and assuming that all cash flows are discretely invested at the end of each monthly period. We then take advantage of the daily data available to calculate the money-weighted return assuming all net cash flows occur discretely at the end of each day. In both cases, the performance gap is

calculated as the difference between the geometric return and the money-weighted return, $r^g - r^{mw}$.

Table 6 reports the arithmetic, geometric and money-weighted returns along with the performance gaps for both GLD and GBS for the period from January 2005 to September 2009 inclusive. Considering the GLD ETF, it is observed that the monthly arithmetic return is 1.59% and the geometric return is 1.44% per month over the whole period. The monthly average money-weighted return for the same duration is 1.31% creating a performance gap of 0.13% per month or approximately 1.6% per annum. This is very similar to the evidence presented by Friesen and Sapp (2007) for mutual funds. When the money-weighted return is calculated using daily data, the average value is estimated as 1.29% and the performance gap is slightly larger at 0.15%. Looking at the individual years it is observed that in both 2005 and 2007 investors' decisions created a greater return than the ETF, however, positive performance gaps, i.e. lower returns, existed in 2006, 2008 and 2009. The latter period was consistent with significant growth in the assets of GLD and hence greatly affected the overall result. Friesen and Sapp (2007) also note that the performance gap for mutual funds increases with the size of the fund.

The second panel of Table 6 reports the returns for the GBS ETF which is traded in the United Kingdom.[13] Performance gaps over the whole period are of a similar magnitude to that of GLD at 0.16% using the monthly data and 0.17% using daily data. In terms of individual years, both 2005 and 2007 were

[13] Slight differences in returns can be attributed to the different trading hours in the United States and United Kingdom.

the best for investors' timing decisions and 2006, 2008 and 2009 were the poorest. The consistency of the results across different ETFs adds greater weight to the notion that investors' decisions in aggregate have been detrimental to their returns.

Conclusion

We have investigated the relationship between gold producing equities and physical gold prices and found, consistent with the evidence of Tufano (1998), that the sensitivity of gold equities to the gold price is not constant. We note that this sensitivity has declined quite considerably in recent years as the gold price has advanced. We also compared the various metrics based on the relative value of gold stock indexes to the price of gold as predictors of future returns to gold equities but found that the explanatory power was generally quite low. The introduction of real interest rates made a significant difference. This highlighted a negative relation with subsequent changes in the underlying gold price as well as being significantly negatively related to subsequent gold equity returns. It was observed that both the substantial increases in gold prices during the period of study from 1975-1980 and from 2001-2007 began during periods of negative real rates, whilst the decline in gold from its 1980 peak was accompanied by a period of tight monetary policy.

However, for this sample period, a simple forecasting method using both gold-HUI variables and the real interest rate did not improve on the returns of a buy-and-hold approach. Finally, we examine the market timing decisions of

investors in gold exchange-traded funds. We note that, in aggregate, investment timing decisions have diminished returns by over 1.5% annually. These observations are supported by both monthly and daily timing methods and are consistent across instruments traded in both the United States and the United Kingdom.

Looking ahead, if real rates stay low, or indeed negative, driven by central bank policies then we can expect continued strength in gold prices. However, tactical market beating strategies are not necessarily robust and investors should consider the passive (ETF) alternative.

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Table 1

XAU Index Changes Ranked According to Gold/XAU Ratio 1983-2009

Gold/XAU Ratio	Monthly Index Changes			Annual Index Changes		
	No. of Observations	No. of Up (Down) Index Periods	Average Monthly Index Point Change	No. of Observations	No. of Up (Down) Index Periods	Average Annual Index Point Change
≥ 5.25	29	18 (11)	4.48%	18	15 (3)	34.05%
5.00 – 5.25	20	11 (9)	1.98%	20	18 (2)	33.36%
4.75 – 5.00	25	15 (10)	2.58%	25	16 (9)	14.14%
4.50 – 4.75	33	22 (11)	1.72%	33	25 (8)	23.03%
4.25 – 4.50	51	26 (25)	0.53%	51	30 (21)	9.36%
4.00 – 4.25	32	18 (14)	-0.16%	32	14 (18)	-2.76%
3.75 – 4.00	25	13 (12)	0.51%	25	6 (19)	-2.92%
3.50 – 3.75	32	15 (17)	-0.63%	32	9 (23)	-10.11%
3.25 – 3.50	26	16 (10)	1.32%	26	7 (19)	-14.49%
3.00 – 3.25	23	9 (14)	-2.05%	23	6 (17)	-14.45%
< 3.00	13	3 (10)	-7.02%	13	0 (13)	-22.29%

Table 2

HUI Returns Explained by Gold-HUI Metrics

	Constant	Coefficient	Adjusted R^2
HUI/GOLD	50.87	-93.95	6.7%
	(2.09)[b]	(2.09)[b]	
$HUI/GOLD^{1.88}$	58.38	-222.16	5.9%
	(2.62)[a]	(-2.19)[b]	

[a] Significant at 1% level
[b] Significant at 5% level
All *t*-statistics are adjusted for overlapping observations using Newey and West (1987)

Table 3

Subsequent 1-Year Changes in Gold Prices Explained by Real Interest Rates 1975-2007

Period	Constant	Real Rate	Adjusted R^2
12/1975 –	15.36	-3.10	7.3%
09/2009	(3.30)[b]	(-2.51)[b]	
12/1985 –	9.29	-2.30	7.7%
09/2009	(4.26)[b]	(-2.51)[b]	
12/1995 –	12.05	-3.23	12.9%
09/2009	(4.41)[b]	(-2.69)[a]	
12/1975 –	18.67	-3.53	7.5%
12/1995	(2.20)[a]	(-1.80)	

[a] Significant at 1% level
[b] Significant at 5% level

Table 4

HUI Returns Explained by Gold-HUI Metrics and Real Interest Rates

Constant	HUI/GOLD	$HUI/GOLD^{1.88}$	Real Rate	Adj-R^2
106.81	-183.99	-	-16.74	51.5%
(5.56)[a]	(-4.70)[a]		(-5.95)[b]	
72.50	-	-218.66	-12.25	33.3%
(2.60)[b]		(-1.90)	(-4.10)[b]	
28.52	-	-	-12.30	27.3%
(3.72)[a]			(-4.63)[b]	

[a] Significant at 1% level
[b] Significant at 5% level

Table 5

Trading Rule Returns Using Gold-HUI Forecasts and Buy-and-Hold Approaches

	No Transaction Costs			With Transaction Costs		
	Total Return (%)	Compound Annual Return (%)	Sharpe Ratio	Total Return (%)	Compound Annual Return (%)	Sharpe Ratio
Panel A. Regression Forecasts						
Recursive Forecasts						
HUI/GOLD	44.4	5.14	0.10	56.8	6.33	0.14
HUI/GOLD$^{1.88}$	107.5	10.47	0.24	106.4	10.39	0.24
Rolling Forecasts						
HUI/GOLD	122.0	11.49	0.25	96.7	9.67	0.20
HUI/GOLD$^{1.88}$	115.4	11.03	0.28	112.2	10.81	0.27
Panel B. Regression Forecasts Including the Real Interest Rate (RIR) as a Variable						
Recursive Forecasts						
HUI/GOLD	108.4	10.53	0.22	102.5	10.10	0.21
HUI/GOLD$^{1.88}$	196.0	15.95	0.33	193.0	15.79	0.33
RIR ONLY	151.1	13.38	0.28	145.9	13.05	0.27
Rolling Forecasts						
HUI/GOLD	113.8	10.92	0.23	105.4	10.31	0.21
HUI/GOLD$^{1.88}$	168.0	14.39	0.30	166.7	14.31	0.29
RIR ONLY	152.7	13.47	0.27	151.4	13.40	0.27
Panel C. Buy-and-Hold						
BUY & HOLD	211.6	16.76	0.35	211.6	16.76	0.35

Table 6

Market Timing Performance of Investors in Gold ETFs

	All	2005	2006	2007	2008	2009 (9mths)
A. GLD ETF						
Arithmetic Return (%)	1.59	1.44	1.84	2.30	0.76	1.59
Geometric Return (%)	1.44	1.37	1.71	2.23	0.42	1.49
Money-Weighted Return (%, Monthly Data)	1.31	1.75	1.43	2.34	0.33	1.35
Performance Gap (%, Monthly Data)	0.13	-0.38	0.28	-0.11	0.09	0.14
Money-Weighted Return (%, Daily Data)	1.29	1.73	1.55	2.38	0.19	1.33
Performance Gap (%, Daily Data)	0.15	-0.36	0.16	-0.15	0.23	0.16
B. GBS ETF						
Arithmetic Return (%)	1.59	1.42	1.84	2.36	0.61	1.76
Geometric Return (%)	1.43	1.32	1.71	2.29	0.24	1.64
Money-Weighted Return (%, Monthly Data)	1.27	1.30	1.50	2.30	0.10	1.54
Performance Gap (%, Monthly Data)	0.16	0.02	0.21	-0.01	0.14	0.10
Money-Weighted Return (%, Daily Data)	1.26	1.32	1.59	2.32	-0.02	1.58
Performance Gap (%, Daily Data)	0.17	0.00	0.12	-0.03	0.26	0.06

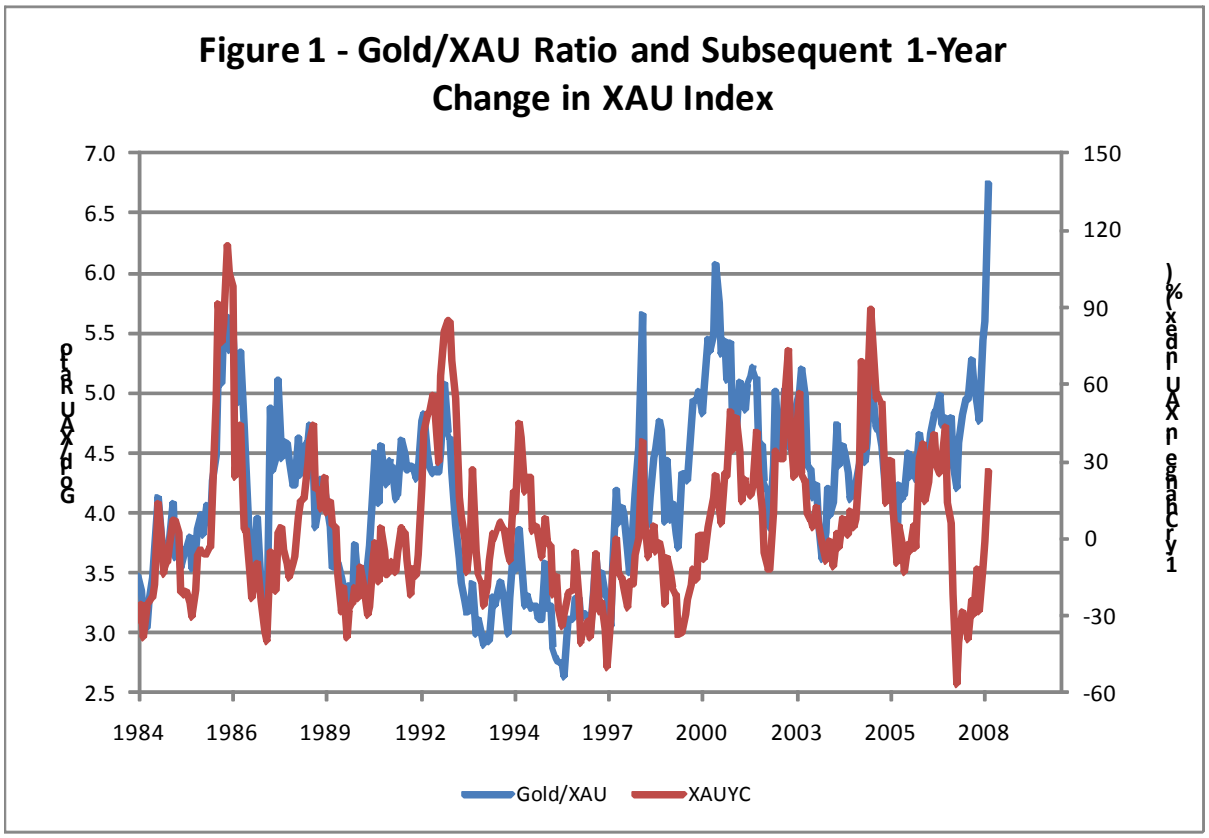
Figure 1 - Gold/XAU Ratio and Subsequent 1-Year Change in XAU Index
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
150
120
90
60
30
0
-30
-60
1984
1986
1989
1992
1994
1997
2000
2003
2005
2008
Gold/XAU
XAUYC

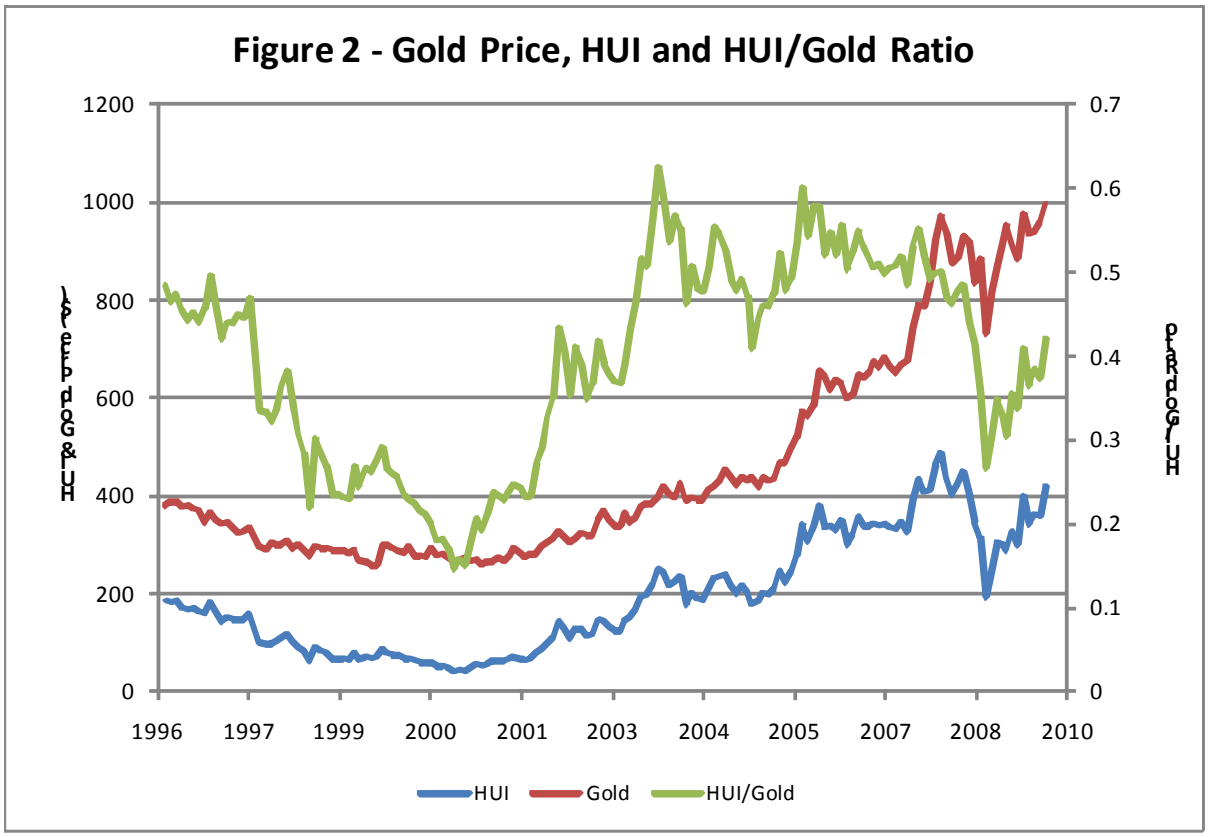
Figure 2 - Gold Price, HUI and HUI/Gold Ratio
1200
1000
800
600
400
200
0
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1996
1997
1999
2000
2001
2003
2004
2005
2007
2008
2010
HUI
Gold
HUI/Gold

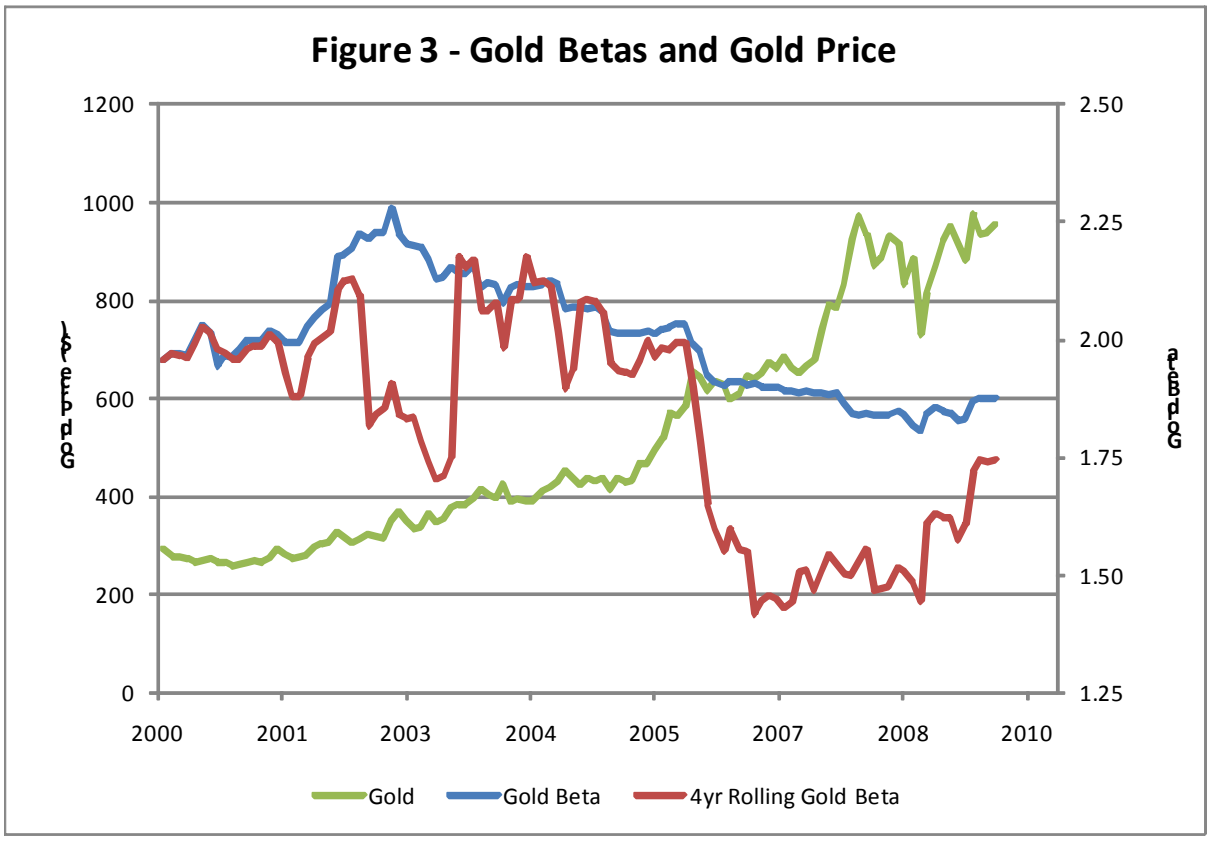
Figure 3 - Gold Betas and Gold Price
1200
1000
800
600
400
200
0
2.50
2.25
2.00
1.75
1.50
1.25
2000
2001
2003
2004
2005
2007
2008
2010
Gold
Gold Beta
4yr Rolling Gold Beta

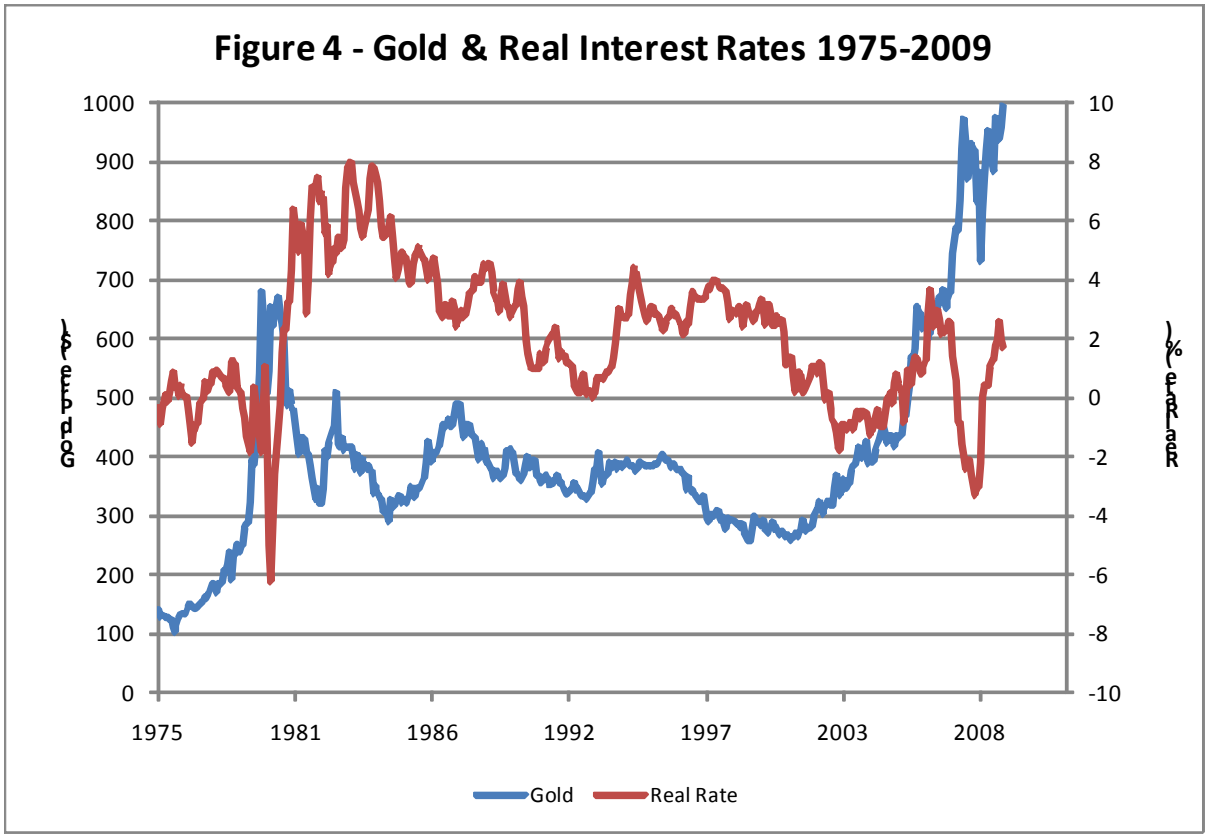
Figure 4 - Gold & Real Interest Rates 1975-2009
1000
900
800
700
600
500
400
300
200
100
0
10
8
6
4
2
0
-2
-4
-6
-8
-10
1975
1981
1986
1992
1997
2003
2008
Gold
Real Rate