

Gold, the Golden Constant, COVID-19, “Massive Passives” and Déjà Vu*

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ABSTRACT

Currently the real, inflation-adjusted, price of gold is almost as high as it was in January 1980 and August 2011. Since 1975, periods of high real gold prices have occurred during periods of elevated concern about high future price inflation. Five years after the real price peaks in January 1980 and August 2011 the nominal (real) prices of gold fell 55% (67%) and 28% (33%), respectively. Today's high real price of gold suggests that gold is an expensive inflation-hedge with a low prospective real return. However, “massive passive” ETF financialization of gold ownership may introduce a period of “irrational exuberance”.

Keywords: Gold, Golden constant, Real gold, ETF holdings, Inflation, Hyperinflation, GLD, Fundamental value, Inflation hedge, COVID-19

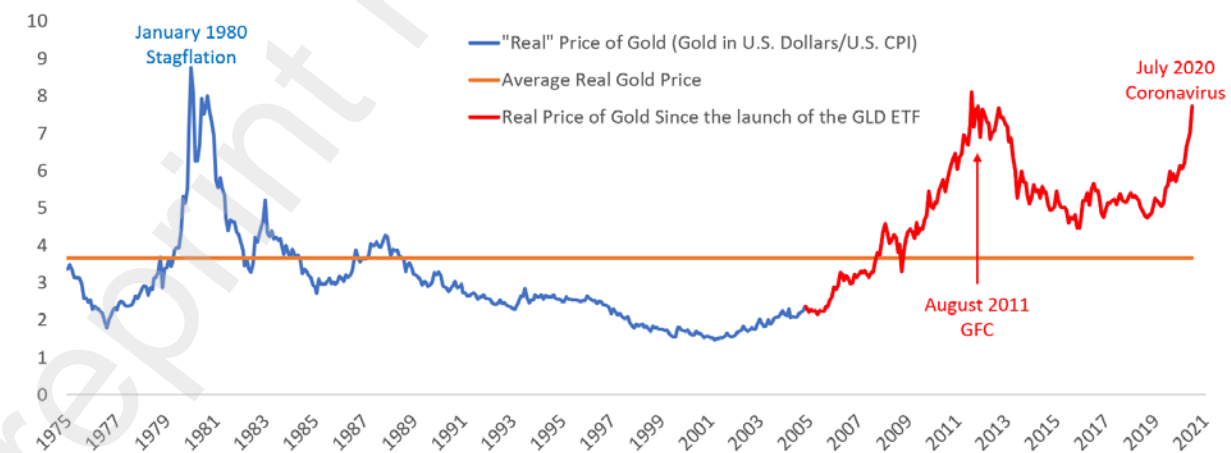
JEL Classification: G10, G11, G12, G15, G28, E58, N20

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The real, inflation-adjusted, price of gold is currently almost as high as it was in January 1980 and August 2011. In 1980, some were concerned that the U.S. economy would continue to experience low, stagnant, real economic growth and high inflation (stagflation). From January 1980 to January 1985 inflation averaged 6.3% per year, the nominal price of gold fell 55% and the real price of gold fell 65%. In 2011, some were concerned that the U.S. Federal Reserve's policy of quantitative easing would lead to a high rate of inflation. From August 2011 to August 2016 inflation averaged 1.2% per year, the nominal price of gold fell about 28% and the real price of gold fell about 33%. Currently, some are concerned that the fiscal and monetary policies implemented in the U.S. to counter the economic impact of the COVID-19 pandemic will be inflationary. If gold did not reward inflation fear in 1980 and 2011, why should it reward inflation fear now?¹

Exhibit 1 shows how the real price of gold has fluctuated since the inception of gold futures trading in January 1975. Real gold prices may matter for those who want to believe that gold is an inflation hedge. The ETF financialization of gold ownership, in which the real price of gold may be correlated with the amount of gold held by gold-owning ETFs, could possibly lead to higher peaks and lower troughs for the real price of gold relative to the experience of the past.²

Exhibit 1
Real (Inflation-Adjusted) Price of Gold, January 1975 to July 2020



Source: Bloomberg data (tickers: GC1 Comdty, CPI INDX Index). January 1975 to July 2020

Erb and Harvey (2013) explored Jastram’s “golden constant” framework which suggests, but offers no proof, that gold is an inflation hedge. They found that, given the extant historical data, the real price of gold was a more important driver of future nominal and real gold returns than the realized rate of inflation.

Exhibit 2 uses the “golden constant” framework to decompose the poor performance of gold following the real gold price peak in January 1980. Just as it is possible to think of a stock’s price as the product of its earnings and its price earnings ratio, it is possible to see the price of gold as the product of an inflation index and the real price of gold.

From January 1980 to January 1985, the price of gold per ounce declined 55% from a price of \$681 to \$304, the U.S. Consumer Price Index rose 35% from 78 to 105.7 and the real price of gold (the price of gold divided by the CPI index) fell 67% from 8.7 to 2.9. Given this decomposition framework, if the real price of gold was constant over time then an increase in the level of inflation should result in an increase in the price of gold. However, since the real price of gold fluctuates widely over time, it’s challenging to know how an increase in the level of inflation will affect the price of gold without knowing how the real price of gold will change.

Exhibit 2

“Golden Constant” Gold Return Decomposition

Date	US Gold Price		US CPI		Real Gold Price
January 1980	\$682	=	78	×	\$8.7
January 1985	\$304	=	105.7	×	\$2.9
Percentage change	-55.4%		35.5%		-67.1%
Annualized return	-14.9%		6.3%		-19.9%

Note: Bloomberg data (tickers: GC1 Comdty, CPI INDX Index).

Exhibit 3 illustrates that the process of decomposing the price of gold into the product of an inflation index and the real price of gold is similar to decomposing the price of a stock

index into an index of earnings and a price earnings ratio. It is simply an accounting identity and tool.³

In a simplified quantitative sense, the golden constant comes down to regressing the price of gold on a measure of inflation, an exogenous (external) variable. The supposed influence of an exogenous variable only works in one direction: here the US CPI supposedly drives the price of gold but the price of gold does not drive US CPI. The golden constant is an unprovable concept exemplifying the aphorism that an absence of evidence is not evidence of absence.⁴

Usually it is hard to link a financial outcome to a specific cause. The supply and demand for gold affects its price and its price affects supply and demand. When variables simultaneously interact with one another (such as price, demand and supply), they are called endogenous variables. For those who invest in stocks as a play on earnings growth, it is unlikely that earnings will be viewed as an exogenous force such as the growth rate of GDP or the amount of rainfall.

Exhibit 3

Gold and Stock Return Decomposition

Date	S&P Composite	Shiller EPS	CAPE Ratio	US Gold Price	US CPI	Real Gold Price
January 1975	\$72.56	= \$8.13	× 8.92	\$175.50	= 52.30	× 3.36
June 2020	\$3,207.18	= \$107.05	× 29.96	\$1,800.50	= 257.21	× 7.00
Percentage Change	4320%	1216%	236%	926%	392%	109%
Annualized Return	8.7%	5.8%	2.7%	5.3%	3.6%	1.6%

Note: Bloomberg data (tickers: GC1 Comdty, CPI INDX Index) and [Shiller data](#)

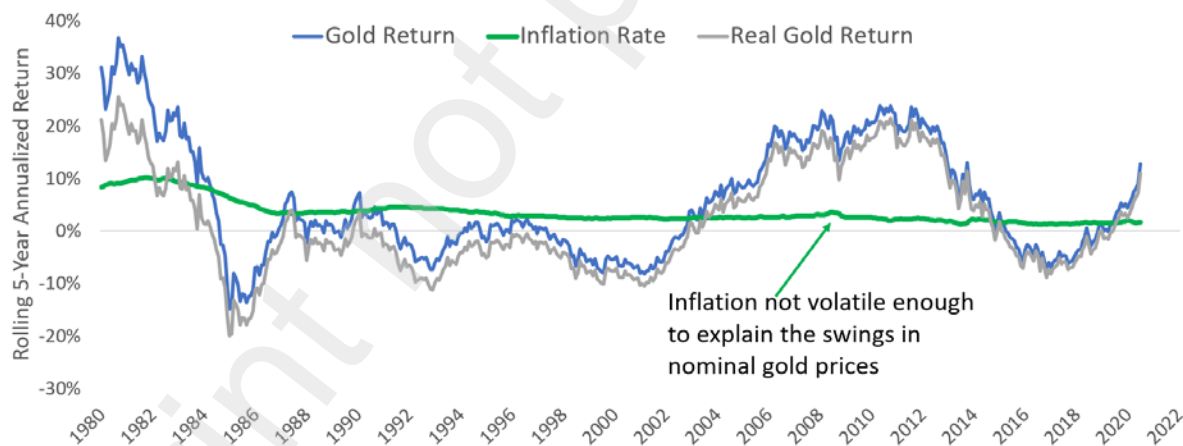
Exhibit 4 extends the “golden constant” decomposition to monthly rolling five-year returns for gold from January 1975 to June 2020. The highest rolling five-year nominal annualized return for gold was about 37% and the lowest was about -15%. The highest rolling five-year annualized inflation rate was about 10% and the lowest was about 1.2%. The highest rolling five-year real gold annualized return was about 25% and the lowest was about -20%. A message of Exhibit 4 is that, even if gold is in some very long-term

sense an inflation hedge, at a five-year time horizon the performance of gold is almost entirely explained by variation in the real price of gold. Kritzman (2015) argued that the risk of investing in equities does not vanish as the investment time horizon increases (there is no time diversification).⁵ In a similar manner, fluctuations in the nominal price of gold will probably continue to be largely driven by the real price of gold, not inflation, regardless of time horizon.

Gold may truly be an inflation hedge but there is not enough data to prove that gold has been an inflation hedge. There is also the interesting nuance of figuring out which definition of inflation gold is supposed to hedge. For instance, in 1996 the Boskin Commission found that inflation measured by the U.S. CPI had been overstated and the Commission's report resulted in inflation being redefined.⁶ Should gold hedge the pre-Boskin Commission report or the post-Boskin Commission report definition of inflation? If neither, then what inflation does gold hedge?

Exhibit 4

Five-Year Gold Return = Five-Year CPI Inflation Rate + CPI-Based "Golden Constant Return"



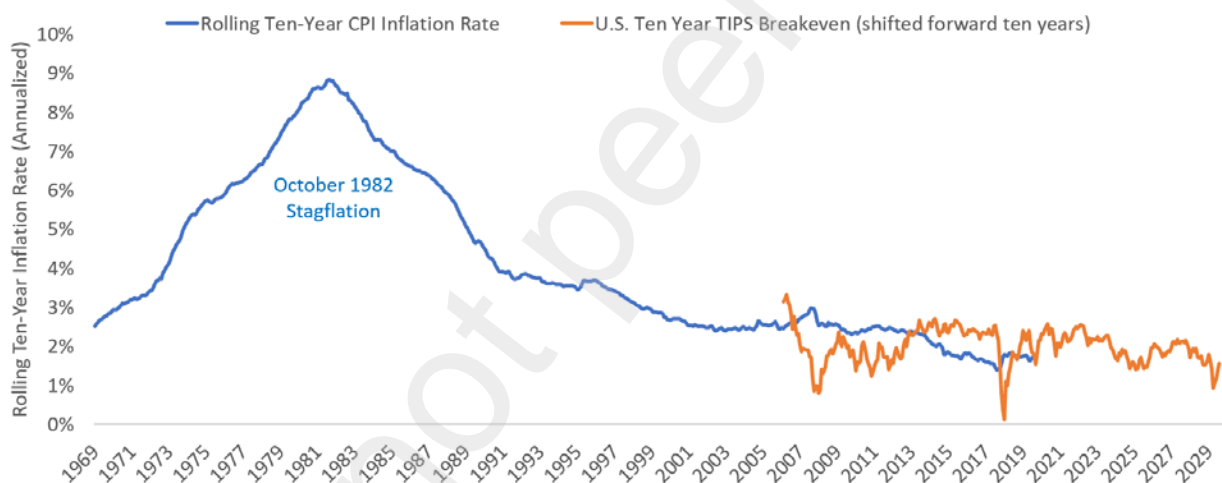
Source: Bloomberg data (tickers: GC1 Comdty, CPI INDX Index). January 1975 to July 2020

The "golden constant" decomposition framework suggests that there are two gold return drivers: the rate of inflation and the real price of gold return.

Exhibit 5 illustrates how the realized rolling 10-year rate of inflation has varied since 1959. The highest rolling 10-year inflation rate of about 9% occurred in October 1982. This is over two years after the January 1980 peak real gold price. The Exhibit also shows the 10-

year inflation breakeven, the yield difference between a 10-year nominal Treasury and a 10-year inflation protected Treasury. With many caveats and qualifications, this yield difference can be thought of as a 10-year inflation rate forecast. The Exhibit shifts this breakeven measure 10 years forward, so the January 1997 breakeven is matched with the January 2007 realized 10-year inflation rate. Whether the 10-year inflation “forecast” has accurately forecasted actual 10-year inflation so far is a matter of personal interpretation. As of July 31, 2020, the 10-year breakeven, the “inflation forecast”, is 1.56%. It could be that fixed income market intervention by the Federal Reserve related to the COVID-19 economic crisis has distorted the ability of nominal and inflation protected debt to provide a useful market-based inflation forecast.⁷

Exhibit 5
Ten-Year Inflation Rates and Breakevens

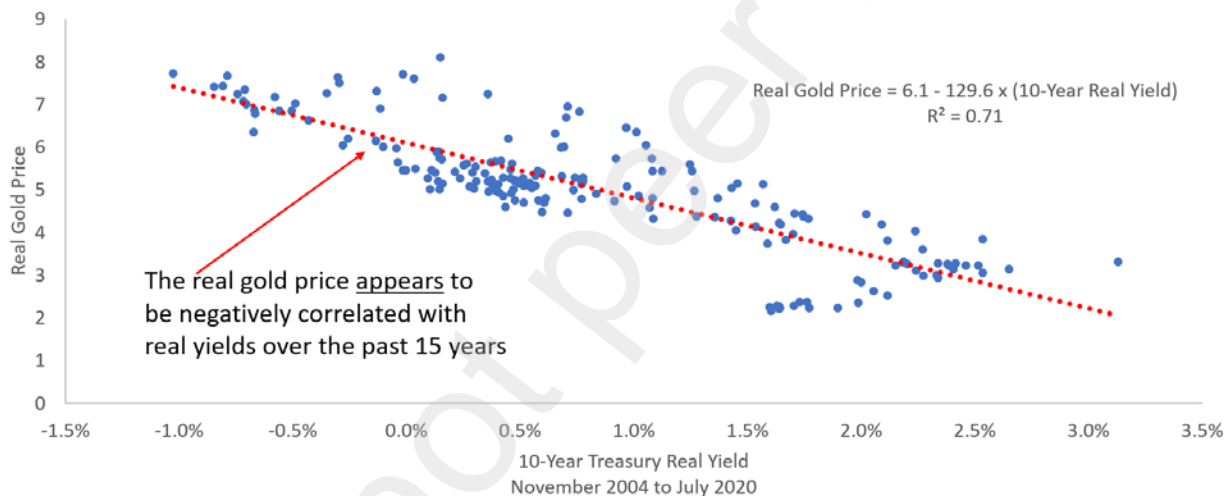


Breakeven yields may provide some highly caveated market-based forecasts of future inflation. However, there are no market-based forecasts of the future real price of gold. Statistically derived models can be employed as a crutch to forecast the future real price of gold.⁸ Models that rely on exogenous factors are more abundant, easier to find and probably less believable than those that consider the interaction of supply, demand and price.⁹ It may be better to find data to support a theory rather than to find a theory to support some data.

One example of “finding a theory to support some data (after the fact)” is the idea that the prices of ostensibly default-free inflation-hedges, such as gold and inflation protected

debt, should zig and zag with one another. If changes in the real yield of inflation protected debt drive changes in the prices of inflation protected debt then maybe real yield will also predict changes in the price of gold. In “Demystifying gold prices”, Johnson (2014) suggests that changes in real yields explain the majority of changes in gold prices.¹⁰ Exhibit 6 illustrates this idea. It is worth noting that price and real yield are simultaneous endogenous variables for an inflation protected bond but real yield is just an exogenous statistical abstraction for the real price of gold. If “gold is a bond”, then Exhibit 6 is extraordinarily compelling. If gold is not a bond, then Exhibit 6 may just be a convenient false discovery resulting from data mining.

Exhibit 6
Real Gold Price and Real Yield



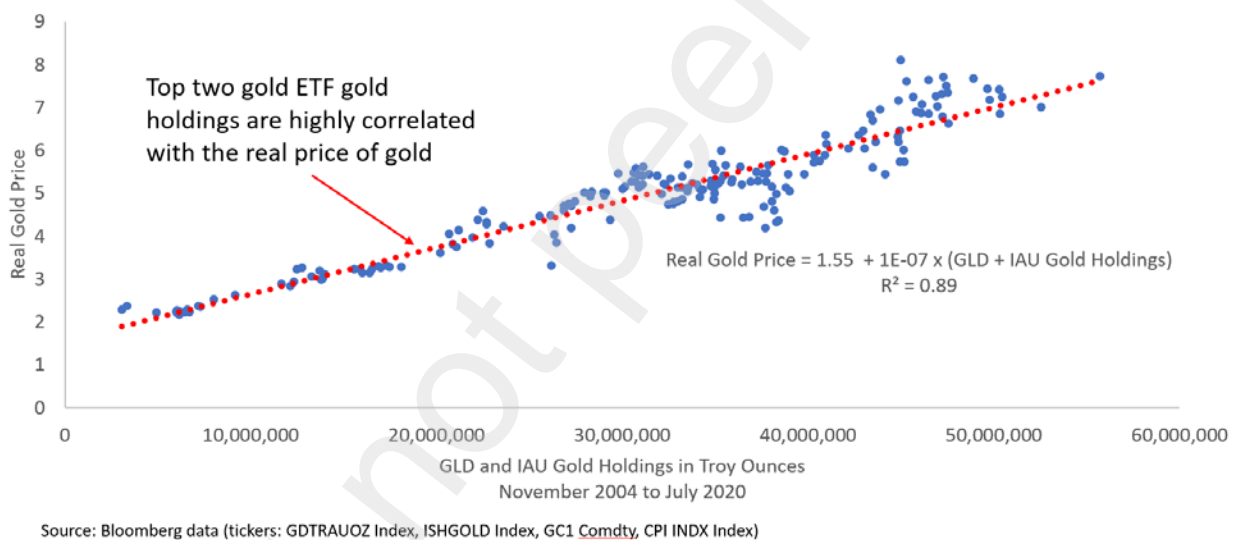
Source: Bloomberg data (tickers: GTII10 Govt, GC1 Comdty, CPI INDX Index)

Exhibit 7 illustrates the historical relationship between the real price of gold and the gold holdings of the two largest gold-owning ETFs.¹¹ As the gold holdings of these ETFs have risen, the real price of gold has risen. These ETF gold holdings represent the majority of demand for gold by ETF investors.¹² It is hard to view these ETF gold holdings as an exogenous variable such as inflation or real yield.¹³ Exhibit 7 can impressionistically be viewed as an illustration of Keynesian demand-pull inflation in which too much money chases too little gold.¹⁴

Exhibit 7 suggests that a buyer on average drives up the real price of gold and a seller on average drives down the real price of gold.¹⁵ In contrast, “gold as a bond” buyers and

sellers are naively assumed to have no impact on the real price of gold. Cases in which too much money chased too little opportunity are not hard to find. In the 1970s, the Hunt brothers (possibly fearing inflation would erode their wealth¹⁶) attempted to corner the market for silver, driving the price of silver from about \$10 an ounce to \$50 (before being wiped out¹⁷). Masters and White (2008) argued that the growing institutional financialization of commodity investment was leading to food and energy price inflation. Chilton (2009) referred to commodity index investors as “massive passives” and observed that massive passives were significant, price-insensitive participants in commodity markets whose growing positions were driving up commodity prices.¹⁸

Exhibit 7
Troy Ounce Holdings of Top Two Gold ETFs and the Real Price of Gold



What you see may not be what you get. Exhibit 8 seemingly illustrates a long-run historical connection between two time series, the population of Equatorial Guinea and the price of the S&P 500 index. This is an example of what Yule (1926) might have called a “nonsense correlation”¹⁹ and what Granger and Newbold (1974) might have referred to as a “spurious regression”²⁰. Combating the frequent view that a picture (or correlation) is worth a thousand words, Engel and Granger (1987) and Johansen (1991) corrected for nonsense and spurious findings with tests for the possible presence of a long-run stable statistical relationship between two or more time series. Not surprisingly, there is no

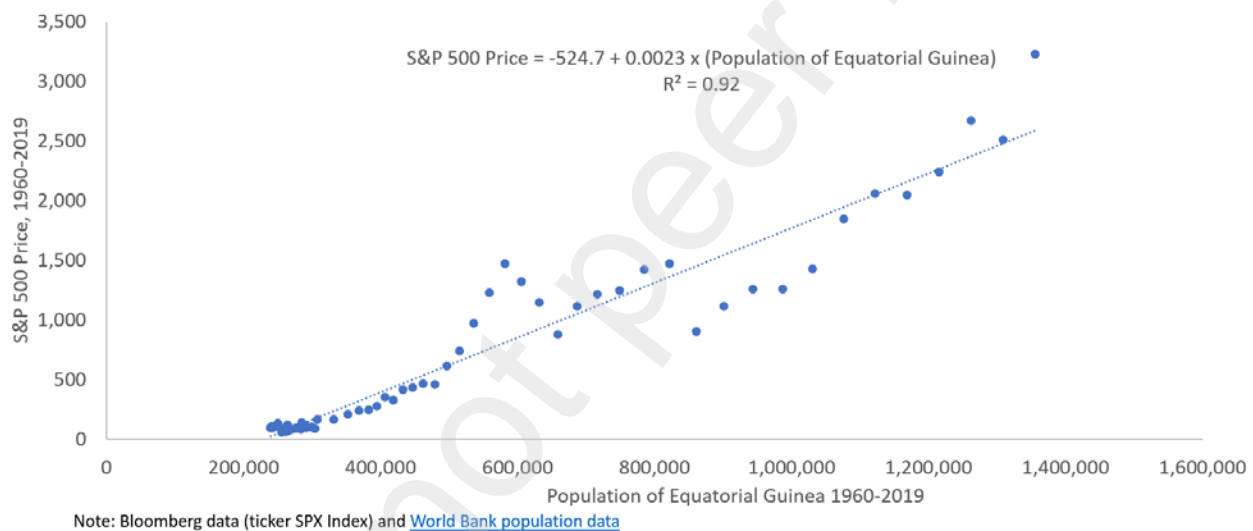
stable long-run relationship, or cointegration, between the population Equatorial Guinea and U.S. stock prices.

Is there a stable, equilibrium, cointegrating relationship between real yields and the real price of gold? No, the “spurious” relationship between real yields and the real price of gold is as real as the relationship between the population of Equatorial Guinea and the price of the S&P 500.

Does there seem to be a stable, equilibrium, cointegrating relationship between ETF gold holdings and the real price of gold? Yes.

Exhibit 8

Spurious Regression: S&P 500 Price and the Population of Equatorial Guinea

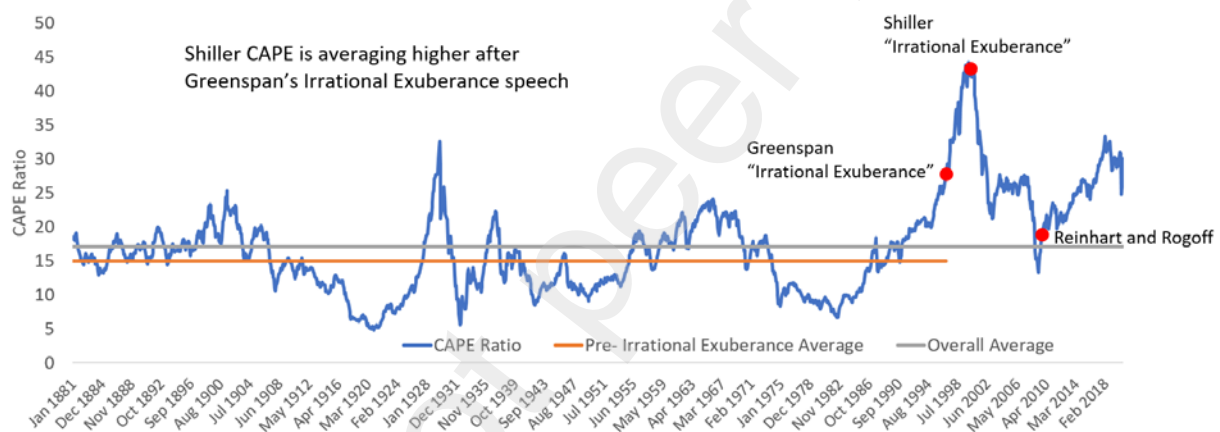


The real price of gold is currently historically high. High real gold prices have usually been followed by low real gold returns. Following the peak real gold prices in 1980 and 2011 both nominal and real gold prices fell substantially. So, when will the expected real price of gold fall?

For those who want to believe that gold is a bond, the expected real price of gold will fall when, and if, real interest rates rise. For those who are intrigued by the influence of “massive passives” the fall will occur when, and if, the gold holdings of “massive passive” gold investors fall.

Even though the real price of gold is high, the path to lower gold prices may not be as straightforward as in 1980 and 2011. Greenspan (1996) warned about “irrational exuberance” when stocks were about as expensive as in 1929. Exhibit 9 shows that the US stock market peak valuation in 2000 was about 40% higher than at the time of Greenspan’s speech in 1996.²¹ High valuation is not a dog whistle commanding an asset to fall and an asset’s future valuation is not range bound by its past. If stocks can experience “irrational exuberance” it is certainly plausible that gold can experience “irrational exuberance”. “Massive passive” ETF gold ownership leading to demand-pull inflation may in turn be a catalyst for “irrational exuberance”.

Exhibit 9
“Irrational Exuberance” Mentioned in 1996



Source: Data from Robert Shiller [website](https://www.fama.org/robertshiller/). Greenspan speech, “The Challenge of Central Banking in a Democratic Society”

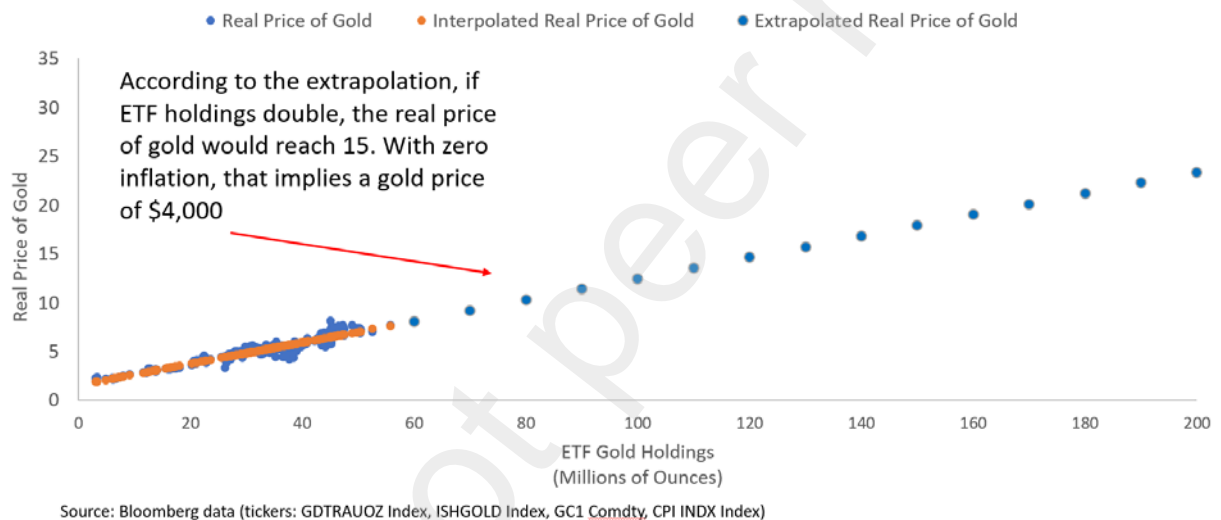
For a believer in the “gold is a bond” story the real price of gold will rise if real yields fall. For a believer in the “massive passive” story the real price of gold will rise if “massive passive” gold holdings rise.

Exhibit 10 traces out the “expected” real price of gold using the observed in-sample historical relationship with ETF gold holdings. In-sample, the real price of gold ranged between 2 and 8. Concern that an irrationally exuberant future real price of gold might be higher (say 15 or 30) than in the observed past cannot be addressed through the technically correct use of an historically based regression model. Regression models interpolate insights from the known known but concern that the future will deviate from

the past requires out of sample extrapolation. Extrapolating with a regression model requires intentionally stretching the model.

In Exhibit 10, every in-sample doubling of ETF gold holdings led, on average, to a doubling in the real price of gold. Extrapolating, every doubling in ETF gold holdings could lead to a doubling in the real price of gold. However, the observable past may be a poor guide to the unseen future. The higher the real price of gold the more likely it is that non-ETF holders of gold will contemplate, at the margin, selling gold. Caveats are innumerable.²²

Exhibit 10
ETF Gold Holdings and the Real Price of Gold



The golden constant framework is an accounting identity: the price of gold equals the product of an inflation index and the real price of gold. Exhibit 11 shows 10-year in the future gold prices as the product of possible future inflation rates and real gold prices. For instance, if the real gold price stays at 7.8 for 10 years and the 10-year inflation rate is 1.56% (the current ten-year breakeven) then the nominal price of gold 10 years in the future should be \$2,328 (rising 1.56% per year from an initial level of \$2,000). If instead personal beliefs suggest that 10-year inflation will average 10.56% per year (perhaps because of some COVID-19 fueled “helicopter money-drop” inflation fear) and the real price of gold rise to 38.9 (perhaps because new mine production grinds to a halt) then the expected price of gold will be \$27,289. The golden constant framework makes it possible to translate beliefs into prices but it is silent on what those beliefs should be.

Since the launch of gold futures trading the real price of gold has averaged about 3.8. If the real price of gold declines to 3.8 then, in order to breakeven nominally, inflation would have to average in excess of 7% per year. Given an expected inflation rate a “breakeven” terminal real gold price can be inferred. Given a terminal real gold price a “breakeven” expected inflation rate can be inferred. Regardless of inflation, mean reversion will lower returns by about 6% per year.

Exhibit 11
The Impact of Inflation and the Real Price of Gold on the Nominal Price of Gold

Gold Price		\$2,000										
Breakeven Inflation		1.56%										
Inflation Index		257.21										
Real Price		\$7.8										
Number of Years		10										
		Expected Nominal Gold Price										
		Expected Inflation Over Next 10 Years										
		0.56%	1.56%	2.56%	3.56%	4.56%	5.56%	6.56%	7.56%	8.56%	9.56%	10.56%
Future Real Gold Price	1.8	\$483	\$533	\$588	\$648	\$713	\$785	\$862	\$947	\$1,038	\$1,138	\$1,246
	2.8	\$755	\$833	\$919	\$1,013	\$1,115	\$1,226	\$1,348	\$1,480	\$1,623	\$1,779	\$1,948
	3.8	\$1,027	\$1,134	\$1,250	\$1,378	\$1,517	\$1,668	\$1,833	\$2,013	\$2,208	\$2,420	\$2,650
	4.8	\$1,299	\$1,434	\$1,582	\$1,743	\$1,919	\$2,110	\$2,319	\$2,546	\$2,793	\$3,061	\$3,352
	5.8	\$1,571	\$1,734	\$1,913	\$2,108	\$2,320	\$2,552	\$2,804	\$3,079	\$3,377	\$3,702	\$4,054
	6.8	\$1,843	\$2,035	\$2,244	\$2,473	\$2,722	\$2,994	\$3,290	\$3,612	\$3,962	\$4,343	\$4,756
	7.8	\$2,115	\$2,335	\$2,575	\$2,838	\$3,124	\$3,436	\$3,775	\$4,145	\$4,547	\$4,984	\$5,458
	8.8	\$2,387	\$2,635	\$2,906	\$3,203	\$3,526	\$3,878	\$4,261	\$4,678	\$5,132	\$5,625	\$6,160
	9.8	\$2,659	\$2,935	\$3,238	\$3,567	\$3,927	\$4,319	\$4,747	\$5,211	\$5,717	\$6,266	\$6,862
	10.8	\$2,931	\$3,236	\$3,569	\$3,932	\$4,329	\$4,761	\$5,232	\$5,744	\$6,301	\$6,906	\$7,563
	15.6	\$4,230	\$4,670	\$5,150	\$5,675	\$6,248	\$6,872	\$7,551	\$8,290	\$9,094	\$9,967	\$10,915
	23.3	\$6,345	\$7,005	\$7,726	\$8,513	\$9,371	\$10,307	\$11,326	\$12,435	\$13,641	\$14,951	\$16,373
	31.1	\$8,459	\$9,339	\$10,301	\$11,350	\$12,495	\$13,743	\$15,102	\$16,581	\$18,188	\$19,935	\$21,831
	38.9	\$10,574	\$11,674	\$12,876	\$14,188	\$15,619	\$17,179	\$18,877	\$20,726	\$22,735	\$24,918	\$27,289

Conclusion

The real price of gold is at levels from which it fell substantially in both 1980 and 2011.

The path to a lower gold price may be as straightforward as in 1980 or 2011

However, the ETF financialization of gold ownership has created “massive passives” that have seemingly created gold demand-pull inflation and driven up the real price of gold.

If too much money is chasing too little gold, then the more the gold holdings of “massive passives” grow the higher the real price of gold could rise. Of course, gold holding sales by non-massive passives could act to reduce the real price of gold.

In the past, movement in the price of gold has been a useless predictor of future inflation. However, in both 1980 and in 2011 high real gold prices coincided with widely held views that future inflation would be significant. Those widely held views ended up being wrong. Perhaps this time is different and one economic legacy of the COVID-19 will be a decade of high inflation. Just as in 1980 and 2011 an expectation of high future inflation is already built into the price of gold. What happens to the price of gold over the next decade will largely be determined by what happens to the real price of gold.

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ENDNOTES

¹ In 1980 reported CPI inflation was high. During the Global Financial Crisis reported inflation was low but there was a fear that inflation could rise. Wolf (2008) noted that because of economic weakness central banks “may soon resort to their most powerful weapons against deflation: the printing press and the ‘helicopter drop’ of money”. Lopez (2011) observed that “The recent expansion in the [monetary base](#) (currency in circulation and bank deposits), brought about by the Federal Reserve’s quantitative easing measures, has stoked fears of high inflation” and “Fears of high inflation are grounded in [memories of the Great Inflation](#), which remain fresh in the minds of many”. Asness (2014) notes that “In 2010, I co-signed an [open letter](#) warning that the Fed’s experiment with an unprecedented level of loose monetary policy - in amount, and in unorthodox method - created a risk of serious inflation.” More recently, Sandbu (2020) speculated that “helicopter money”, a concrete money printing monetary phenomenon, might be a way to pay for the fiscal costs associated with recovering from the impact of the coronavirus. Jones and Georgianni (2020) note that “Covid-19 is a one-of-a-kind virus that has triggered a one-of-a-kind policy response” which they label “The Great Monetary Inflation”.

² Ben-David, Franzoni and Moussawi (2015) find that “Due to their exceptional liquidity, ETFs are likely to be a catalyst for noise traders” and that “ETFs introduce new noise into the market, as opposed to just reshuffling existing noise across securities”. Chari and Christiano (2017) find no support for the financialization view that “increased trading activity is associated with increases in commodity spot price growth and spot price volatility”.

³ An accounting identity is different from an asset pricing hypothesis. An “[accounting identity is an equality that must be true regardless of the value of its variables, or a statement that by definition \(or construction\) must be true](#)”. It can be quite challenging to define what an asset pricing hypothesis is but it is generally the case that an asset pricing hypothesis is not an accounting identity. In this accounting identity sense the real price of gold is analogous to a stock’s price earnings ratio and an index of inflation is analogous to a stock’s earnings per share. Additionally, Erb and Harvey (2016) suggest that the real price of gold is to gold as the price-earnings ratio is to stocks.

⁴ There are at least two reasons that the “golden constant” is an unprovable concept. The first is that the golden constant idea is so broadly described (as an assertion that the purchasing power of gold is constant over time) that there is no way to test it. There is no unambiguous way to define purchasing power and because of the generally non-stationarity of observed returns empirical observations over different time periods are likely to support different interpretations and narratives. In this regard, the golden constant is much like the Capital Asset Pricing Model, in which asset returns are theoretically driven by ex-ante expectations of unmeasurable perceptions of risk (not driven by backward looking measured volatility or covariance). The second reason is that data on gold as a tradeable investment start in 1975. It is possible to calculate sample statistics for the performance of gold over this 45 year time period. However, unless gold returns come from a stationary distribution a 45 year sample may have little relevance for future returns. These twin issues (vaguely phrased investment hypotheses and an absence of empirical data to test a hypothesis) probably plague all investment propositions. The fact that a poorly defined investment hypothesis is untestable also makes a poorly defined investment hypothesis irrefutable.

⁵ Also see Bodie (1995).

⁶ The [Boskin Commission](#) found that inflation measured by the CPI was overstated by over 1% per year. The recommended changes in the calculation of inflation affected the cost of living adjustments received by Social Security recipients. The Boskin Commission’s findings might have been objective and free of political influence or the Commission’s finding might have been predetermined prior to the Commission’s formation. One way of thinking about this largely unanswerable question is whether or not the Boskin Commission was, subject to the data, equally likely to determine that the CPI was underreporting inflation as overreporting inflation.

⁷ Does the real price of gold do a better job than the currently observable breakeven inflation rate at forecasting the future 10-year rate of return? No, from January 1975 to July 2010 the real price of gold

essentially explains none of the variation in the realized 10-year inflation rate from January 1985 to July 2020.

⁸ This is not a suggestion that statistically derived models should be used. Rather it is a practical observation that if order is preferred to disorder then a statistical model fit to signal or to noise will often be preferred to no model at all.

⁹ Imagine regressing the price of any company's shares on exogenous variables such as US GDP, the CPI, the average daily temperature in the US or random white noise. With enough experimentation and ingenuity, a few exogenous variables will emerge as in-sample predictors of the price of the company's shares. If "predictor" variables can be segregated into groups of exogenous and endogenous variables, it is possible that the number of exogenous variable data mining false discoveries will be greater than the number of endogenous variable data mining false discoveries (because the number of exogenous variables is in general vastly larger than the number of endogenous variables).

¹⁰ In the context of a mea culpa for once referring to gold as a "pet rock", Zweig (2020) offers an example of the acceptance of the idea that "gold is a bond" by offering an opinion "that low interest rates in the U.S. and negative rates elsewhere will drive gold higher" and that "low rates have fueled high returns for gold."

¹¹ The SPDR Gold Trust (ticker GLD) and the iShares Gold Trust (ticker IAU).

¹² Because the price of GLD shares is one-tenth the price of gold, the real price of GLD is one-tenth the real price of gold.

¹³ It is, of course, possible to defend the "gold is a bond" view by expanding the argument from changes in real yield drive changes in the real price of gold to changes in real yield drive changes in gold holdings which in turn drive changes in the real price of gold.

¹⁴ Keynesian demand-pull inflation is often referred to as "too much money chasing too few goods" or as a situation in which aggregate demand grows faster than aggregate supply.. The World Gold Council (2020) claims that over 197,576 metric tons of gold have been mined throughout history. The fact that the supposedly most authoritative source for the history of gold production comes from a gold industry advocacy group rather than an outside compiler of data introduces any number of reasons to be suspicious of the estimate of the above ground stock of gold. The World Gold Council notes that each year about 2,500-3,000 metric tons of gold are mined each year. This works out to roughly an annual increase in the above ground stock of gold of 1.27-1.51%.

¹⁵ The R^2 of the plotted data in Exhibit 6 is about 77% and the R^2 -squared of the plotted data in Exhibit 7 is 82%. Those who believe that gold is a bond can no doubt connect the two exhibits by suggesting that gold holdings are simply an intermediate and unnecessary accounting observation stuck between the connection between real yields and the real price of gold. It makes sense for fixed income managers to suggest that gold is a bond because the assertion expands the universe of investment products they can manage. Real yield and gold holdings are highly correlated. There are various statistical tools (such as principal components, partial least square and LASSO regression) that offer absolutely no insight into identifying the true driver of the real price of gold. In general there is no reason for a manager of a gold fund to highlight the positive correlation between gold holdings and the real price of gold since it would suggest that client asset accumulation is a disservice to clients.

¹⁶ Iskryan (2016) writes engagingly about the Hunt brothers but it is hard to determine what is fact or invention.

¹⁷ The Hunt brothers' had significant exposure to silver futures contracts and in early 1980 the COMEX instituted "Silver Rule 7" which made it difficult for the Hunts to maintain their positions.

¹⁸ Cheng and Xiong (2013) find no evidence that commodity financialization, in which "commodity futures have become a popular asset class for portfolio investors, just like stocks and bonds", find no support for the idea that a growing amount of institutional investment in commodities affected prices. Part of the reason for finding no support for the idea is that they sidestep the idea: "The large inflow of investment capital to commodity futures markets in the past decade has generated a heated debate about whether financialization distorts commodity prices. Rather than focusing on the opposing views concerning whether investment flows caused a price bubble, we critically review academic studies through the perspective of how financial investors affect risk sharing and information discovery in commodity markets".

¹⁹ For example, Yule pointed out that it may be possible to see a significant correlation between two random walk variables, such as the evolution over time of the mortality rate in England and the proportion of Church of England marriages, without there being any underlying connections between the two time series.

²⁰ Granger and Newbold use simulated data to make their point. Leinweber ([2007](#)) uses a database of economic time series to illustrate the abstract argument of Granger and Newbold.

²¹ The September 1929 U.S. Shiller CAPE ratio was 32.56, the December 1996 CAPE ratio was 27.72 and the December 1999 U.S. Shiller CAPE ratio was about 44.20. From the perspective of December 1996, it might have been possible to look at a historical time series of the CAPE ratio and arrive at the conclusion that the 1996 valuation seemed eerily similar to 1929. Campbell and Shiller ([1998](#)) noted that valuation “ratios are extraordinarily bearish” adding that the “only previous year with a comparably high ratio is 1929”.

²² If the ten-year Treasury real rate fell to -7.60%, then in a similarly extrapolated model the real price of gold might rise to 14. If the real rate fell to -26.22%, the real price of gold might rise to 35 (or a nominal price of \$10,000 an ounce). Which is more likely, that real yields will fall to -7.6% or that the gold holdings of GLD will double? Which is more likely, that real yields will fall to -26.22% or that the gold holdings of GLD will rise six-fold? If real yields do not fall from current levels then the “gold is a bond” framework suggests that the real price of gold will not rise even if the gold holdings of GLD double or sextuple.