



# Is gold the best hedge and a safe haven under changing stock market volatility?

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## ABSTRACT

We evaluate the role of gold and other precious metals relative to volatility (Volatility Index (VIX)) as a hedge (negatively correlated with stocks) and safe haven (negatively correlated with stocks in extreme stock market declines) using data from the US stock market. Using daily data from November 1995 to November 2010, we find that gold, unlike other precious metals, serves as a hedge and a weak safe haven for US stock market. However, we find that VIX serves as a very strong hedge and a strong safe haven during our sample period. We also find that in periods of extremely low or high volatility, gold does not have a negative correlation with the US stock market. Our results show that VIX is a superior hedging tool and serves as a better safe haven than gold during our sample period. We highlight the practical significance of our results for financial market participants by conducting a portfolio analysis.

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## 1. Introduction

In recent years stock markets around the globe have experienced high volatility and unexpected declining returns. A key question is which investment vehicles serve as a hedge (negatively correlated with stocks) or safe haven (negatively correlated with stocks in extreme stock market declines) in different periods of stock market volatility. Our paper attempts to answer this important question. We start with gold as a leading candidate since it receives widespread attention in the financial news. Jaffe (1989) shows that the addition of gold to various hypothetical portfolios increases the average return while reducing the standard deviation. Hillier, Draper, and Faff (2006) note that the major benefit of precious metals is shown to be their ability to hedge adverse market conditions because precious metals perform best during periods of high market volatility. However, the first study which formally tests if gold is a hedge or safe haven was done by Baur and Lucey (2010). They find that gold is a hedge against stocks on average and a safe haven in extreme stock market conditions using daily data from 1995 to 2005. Another study on this specific topic was by Baur and McDermott (2010), who examine the role of gold in the global financial system by testing the hypothesis that gold represents a safe haven against stocks of major emerging and developed countries. Using data from 1979 to 2009, they show that gold is both a hedge and a safe haven for the US and major European stock markets but not for emerging stock markets.

There is widespread evidence suggesting that volatility in stock markets is asymmetric implying that returns and conditional volatility are negatively correlated. Seminal paper by Christie (1982) documents and explains this asymmetry based on the leverage hypothesis. He argues that a drop in the value of the stock (negative return) increases the financial leverage making the stock riskier thus increasing the underlying volatility. These “leverage effects” have become synonymous with asymmetric volatility although this asymmetric response could be generated by the volatility feedback effect driven by time varying risk premium as documented by Campbell and Hentschel (1992). They contend that news brings higher current volatility and thus increases future volatility since volatility is highly persistent. This higher volatility raises the required return resulting in a stock price decline. It is now widely believed that none of these effects by itself explain the total asymmetry in equity markets and in reality both effects are in play simultaneously as shown by Bekaert and Wu (2000). Malik (2011) shows that the negative relationship is even stronger than previously reported. The remarkably strong negative correlation between volatility and equity prices during market downturns offers a timely protection against the risk of a potential capital loss.<sup>2</sup> Based on the reported empirical evidence, we incorporate volatility into our analysis to see if it serves as a hedge and/or safe haven. A study by Briere, Burgues, and Signori (2010) shows that a long exposure to volatility is very valuable for diversifying an equity portfolio, especially during equity market downturns. However, to the best of our knowledge, this is the first paper to make a direct comparison between gold and volatility

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<sup>2</sup> Whaley, the creator of VIX, even suggests that part of the purpose of VIX is to serve as a hedge to stock investing (Whaley, 2009)

**Table 1**  
Descriptive statistics.

	S&P 500	Gold	Silver	Platinum	VIX
Arithmetic mean	0.03%	0.04%	0.06%	0.05%	0.20%
Geometric mean	0.02%	0.03%	0.04%	0.04%	0.02%
Annualized geometric mean	4.53%	8.84%	11.90%	9.68%	4.80%
Standard deviation	1.31%	1.09%	1.84%	1.48%	6.16%
Skewness	0.00	0.32	−0.77	−0.19	1.02
Kurtosis	10.59	11.13	12.44	8.28	8.79
Minimum	−9.03%	−6.98%	−18.44%	−9.22%	−29.57%
Median	0.06%	0.02%	0.10%	0.04%	−0.33%
Maximum	11.58%	10.79%	14.07%	10.56%	64.22%
Correlation	100.00%	−1.83%	9.99%	11.61%	−74.08%

**Notes:** The sample is the 3777 daily returns from November 30, 1995 to November 30, 2010. The correlation for each asset is its correlation with the S&P 500. The annual geometric mean for each asset is its effective annual rate of return over the entire sample period.

as a potential hedge or safe haven. This information will be particularly useful to financial market participants since volatility is readily tradable, with Volatility Index (VIX) on the Chicago Board Options Exchange (CBOE) being the most prominent derivative.<sup>3</sup>

Conover et al. (2009) suggest that investors could considerably improve portfolio performance by adding a significant exposure to the equities of precious metals firms. Riley (2010) shows that precious metals have advantages like good expected returns and strong negative correlations with other asset classes. Additionally, studies like Hammoudeh, Malik, and McAleer (2011) have highlighted the importance of other precious metals besides gold in risk management. Given the growing relevance of other precious metals, we also include silver and platinum in our analysis to see how they compare with gold as a potential hedge or safe haven.

The econometric approach in this paper is based on a regression model in which asset returns (gold, silver, platinum, or volatility) are regressed on stock returns and interaction terms that test whether the particular asset indeed serves as a hedge or safe haven if the stock market declines. We use daily data from November 1995 to November 2010. Our sample period is particularly pertinent as it includes the recent financial crises. A key feature of equity returns is that volatility is time varying and undergoes shifts in variance [See Starica and Granger (2005)]. Consequently, we also extend the literature by studying how these different assets correlate with the stock market within the endogenously determined volatility regimes.

Our results show that platinum and silver do not serve as a hedge or safe haven for the US stock market but gold serves both of these functions. Interestingly, VIX serves as a stronger hedge and a better safe haven than gold during our sample period. We also find that gold does not have a negative correlation with the US stock market in extremely low volatility periods or in extremely high volatility periods, but VIX maintains a negative correlation at all times. Our results suggest that VIX is a superior hedging tool and serves as a better safe haven than gold during our sample period.<sup>4</sup>

## 2. Definitions

Following Baur and McDermott (2010), we define a hedge and a safe haven as follows:

<sup>3</sup> Exposures to volatility can be made by investing in VIX futures contract or an Exchange Traded Fund (ETF) on VIX. On the other hand, investment in gold can be made through a variety of investments. An investor can buy gold coins, gold jewelry, gold bullion, gold ETF or gold futures. There are more alternatives to invest in gold and some of them offer investments without a counterparty (futures exchange or ETF provider) involved with potentially strong implications for a safe haven asset.

<sup>4</sup> Our results make a timely contribution as during the writing of this manuscript financial markets across the globe are experiencing unprecedented volatility and declining returns mainly due to economic problems emanating from Europe.

### 2.1. Hedge

A strong (weak) hedge is defined as an asset that is negatively correlated (uncorrelated) with another asset on average.

However, it has to be noted that a hedge does not necessarily have the property of reducing losses in periods of extremely declining markets as the asset could exhibit a positive correlation in such periods and a negative correlation in normal times which could result in a negative correlation on average.

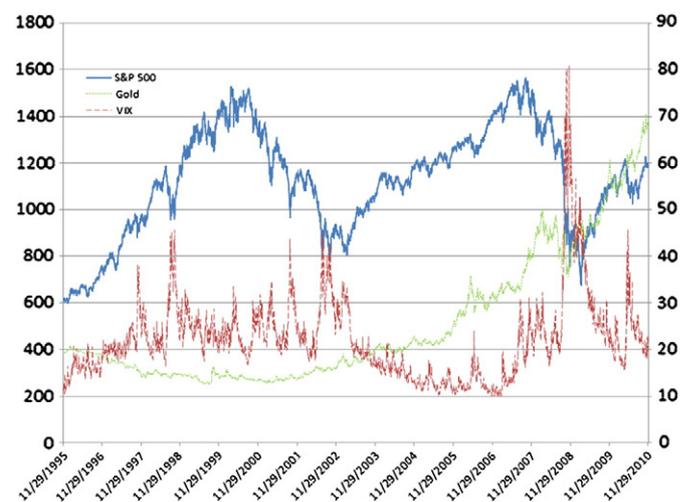
### 2.2. Safe haven

A strong (weak) safe haven is defined as an asset that is negatively correlated (uncorrelated) with the stock market in periods of extreme stock market declines.

The specific property of a safe haven asset is the non-positive correlation with the stock market in extreme market conditions. However, note that this property does not force the correlation to be positive or negative on average but only to be zero or negative in specific periods of stock market declines.

## 3. Data analysis

The data consist of daily closing spot prices for gold, silver, platinum, the S&P 500 Index, and VIX. All the data used in the paper was obtained from Bloomberg. The data covers from November 30, 1995 to November 30, 2010. Our sample period is particularly interesting since it includes the financial crisis of 2008–09. All precious metals are traded at



**Fig. 1.** Movement in levels of the S&P 500, gold and VIX. **Notes:** The figure shows the level of the S&P 500 index, VIX and the price of gold for the 15 year sample period from November 1995 to November 2010 (daily data). The S&P 500 index and price of gold are measured on left vertical axis while VIX is measured on right vertical axis.

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