

## **The Power of Gold: An Initial Look at Trading Strategies Using Gold-based ETFs and ETNs 2009-2014**

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*We examine the effectiveness of trading strategies that use exchange-traded funds (ETFs) and exchange-traded notes (ETNs) that offer various types of exposure to gold returns. The strategies are based on the results of recent research that indicate gold is a safe haven when financial market risk increases. We make adjustments to a stock/bond/gold portfolio based upon signals provided by the VIX and examine the effectiveness and relative effectiveness of the gold-related vehicles to enhance return. We also examine the returns of the ETFs and ETNs on a stand-alone basis. Our findings show that improved portfolio performance could have been possible over the sample period 2009-2014 by increasing exposure to gold when the VIX rises above a certain threshold and reducing exposure to gold when the VIX declines. The best results are from using an ETF that provides a simple one-to-one, i.e., unlevered, positive exposure gold, and the results support the hypothesis that gold is a safe haven. The other choices of financial vehicles that offer a levered and/or inverse relationship to gold are found to be less effective or to offer no benefits in the strategies we employ here.*

**JEL Codes:** G1, G02 and G11

### **1. Introduction**

The potential for enhancing portfolio return with commodities receives a lot of attention from academics and practitioners. Previous research has shown that gold returns and equity returns have a negative relationship during some periods and, therefore, that gold has served as a safe haven during times of market turmoil.<sup>i</sup> In 2004, gold-based exchange-traded funds (ETFs) became available and began offering convenient vehicles for adding one-to-one, i.e., unlevered, positive exposure to gold for investors' portfolios. Investors with a wide range of sophistication levels could use the ETFs. A few years later, more exotic vehicles became available in the form of ETFs and exchange-traded notes (ETNs); henceforth, we use the term exchange traded vehicles (ETVs) for ETFs and ETNs. Now ETVs are available that provide unlevered and levered exposure on both the upside and the downside. The purpose of this paper is to examine the effectiveness and relative effectiveness of these ETVs in improving the performance of a traditional portfolio consisting of stocks and bonds as well as their potential for earning returns as stand-alone trading vehicles over the years 2009 to 2014. Our work demonstrates that gold-based ETVs can serve as a safe haven; furthermore, it adds to the literature an investigation into the relative usefulness of the newer products that offer returns that are functions of gold returns.

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This is an important topic because of the increasing number and variety of ETVs available to investors of all sophistication levels.<sup>ii</sup> Because ETVs are so readily available, there is a need to examine the role of these ETVs in a portfolio, the potential benefits from active strategies that use these ETVs, and the potential harm that might come from using them. To our knowledge, this is the first study that compares the properties of the returns of several types of ETVs on a commodity. In addition to investors finding the results useful, investment companies and regulators can also assess the benefits and possible harm from the trend in the development of ETVs with ever more complex returns.

We employ basic trading rules that most investors could easily understand and employ. The rules are based on movements of the VIX, which give signals for adjusting the portfolio weights on ETVs that can be added to a traditional portfolio made up of stocks and bonds. A signal based upon the VIX would trigger a decrease (increase) in the portfolio weights on stocks and/or bonds and an increase (decrease) in the weight on the selected gold-based ETV. Variations of this strategy using the other ETVs as part of a stock/bond/ETV portfolio are also explored. We also examine the performance of a trading strategy using the ETVs on a stand-alone basis. In general, we find that using the unlevered, positively-correlated gold ETV has the best results with respect to both its role in a traditional portfolio and the potential returns as a stand-alone asset. The ETV that has a positive, levered exposure to gold also had the ability to improve portfolio performance and earn a positive profit, but to a lesser degree on both points.

Following the literature review in Section 2, we describe the ETVs and then explain the trading strategy in more detail in Section 3. Section 4 provides the results, and Section 5 summarizes our findings and discusses the value of developing and using exotic ETVs. That section also offers suggestions for future research.

## 2. Literature Review

Gold increases portfolio diversification through its low correlation with equities and other assets (Grubb et al., 2013), and much of the research on gold has focused on its role in risk management. Gold has shown the potential to reduce portfolio losses during tail-risk events. For example, Grubb et al. (2010) finds that portfolios with a 3% to 9% allocation to gold outperform those without gold during recessions. This has led researchers to refer to gold as a safe haven, which means that it has a negative or zero correlation with a conventional portfolio during adverse market conditions (Baur and Lucey, 2010, Baur and McDermott, 2010 and Hood and Malik, 2013).

Value-at-Risk (VaR) is one popular measure of downside risk. VaR gives an estimate of the largest losses that a portfolio is likely to suffer during all but exceptionally bad periods. It is defined as the maximum potential loss of portfolio value with a given probability over a given time period. The probability and time period are chosen by the agent computing VaR.<sup>iii</sup> A fund manager might specify the time period as one week and the frequency of maximum loss as 95%, for example, and then use the properties of the fund's returns to find that the VaR is \$1 million. The expectation is that, on average, in 19 out of 20 weeks of trading the fund would not lose more than \$1 million. Another way of expressing this is that the fund would expect the nominal return to be below negative \$1 million once every 20 weeks.

According to the Grubb et al. (2010), having a portfolio weight in gold from 3% to 9% might reduce the weekly VaR by up to 15%, e.g., from \$1 million to \$0.85 million. Grubb et al. (2010) investigates the VaR reducing properties of gold by demonstrating how gold can lower losses without sacrificing long-run return. That study explores this under two scenarios. The first

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scenario computes appropriate portfolio weights based on returns and correlations estimated over both normal times and times of market turmoil. The second scenario proposes weights that pertain only to times of market turmoil. A period of market turmoil is defined as when U.S. equities decrease by more than two standard deviations from the expected value. The latter portfolios are designed to maximize returns during such periods of higher risk. Then, for each scenario, Grubb et al. (2010) compares the results of the portfolios that include and that do not include gold. The results from these two approaches are summarized in Table 1, which is borrowed from that study.

<b>Table 1: Portfolio performance with and without gold during normal market conditions and in a high risk scenario.</b>				
	Average Risk Scenario		High Risk Scenario	
	without gold	with gold	without gold	with gold
Gold weight (%)	0	3	0	9
Expected annual return (%)	6.6	6.5	7.9	7.7
Annual volatility	3.2	3.1	11.0	10.4
2.5% VaR (\$)	76,000	71,000	318,000	301,000
Gain/loss by including gold (%)	-	6.4		5.5
1.0% VaR (\$)	108,000	96,000	443,000	429,000
Gain/loss by including gold (%)	-	11.3	-	3.3

Source: Grubb et al. (2010), p 12.

The findings in Grubb et al. (2010) demonstrate how relatively small allocations of gold (from 3% to 9%) help investors reduce potential losses without substantially lowering expected return. Using the data from January 1987 to July 2010, Grubb et al. (2010) compute average returns, volatilities and weekly VaRs for the portfolios. The results in Table 1 indicate that including gold in a portfolio reduces volatilities and VaRs, and yet delivers similar expected returns. For example, adding 3% gold to the portfolio mix reduces annual return by only 0.1%, but it reduces weekly VaR with a 97.5% confidence level from \$76,000 to \$71,000. This represents about a 7% decline in VaR. If we change the confidence level for the VaR to 99%, meaning that we now look at 99 out of 100 weeks, then the portfolio with 3% gold would not lose more than \$96,000 as compared to \$108,000 without gold, i.e., VaR falls by over 10%.

Furthermore, with a higher allocation to gold to a weight of 9% and assuming that the market is in turmoil (high risk portfolio), Table 1 shows that the annualized portfolio variance goes down from 11% without gold to 10.4% with gold. The weekly VaR drops by 5.5% from \$318,000 to \$301,000 for a 97.5% confidence level. For a 99% confidence level, the VaR drops by 3.3% from \$443,000 to \$429,000. This finding implies that for 99 out of 100 weeks, a high-risk portfolio losses would not exceed \$429,000 on a \$10 million portfolio.

Grubb et al. (2010) also posits that positions in gold can enhance returns as well as limit losses. During the 2007-2009 recession, for example, including a 3% allocation of gold improved returns by 0.173%. A 6% allocation of gold increased the returns by 0.426% during the same time period.

Most studies focus on the risk-reduction properties of gold. To better define the role of gold in a portfolio, Baur and Lucey (2010) posit specific definitions for the terms diversifier, hedge, and safe haven and also explain what distinguishes each term from the others. They define a diversifier as an asset that is positively but not perfectly correlated with another asset or portfolio over all periods. It does not have special properties that come into play and reduce losses in adverse market conditions. Likewise, a hedge is an asset that is uncorrelated or negatively

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correlated with another asset or the rest of the portfolio in all periods. In other words, the relationships of diversifiers and hedges with the rest of the portfolio do not change during times of market turmoil. The diversifiers will tend to decline with the rest of the portfolio, and hedges could exhibit a random positive correlation with the portfolio for which it was chosen to help protect. In other words, both diversifiers and hedges can decline in value during a recession along with the rest of the portfolio.

A safe haven, on the other hand, is an asset that is uncorrelated or negatively correlated with another asset or portfolio in adverse financial market conditions. This does not imply that the correlation will be either positive or negative, on average, over all periods, but the correlation of a safe haven asset is zero or negative in specific periods. Hence, in normal times and bullish market conditions, the correlation can be positive or negative. If it is negative during normal and bullish periods, then the investor would exclude the safe-haven asset during those periods while benefiting from the negative correlation in adverse financial market conditions.

Using the return data on international stocks, bonds and gold from November 30, 1995 to November 30, 2005, Baur and Lucey (2010) find gold to be a hedge against stocks, on average, and a safe haven in extreme market conditions, but the latter property is short-lived. They describe the changes in a portfolio comprising gold and stocks over the 50 trading days after the occurrence of an extreme negative stock return. The cumulative gold return increases slightly at the time of the initial shock, and then remains around zero in the United States and Germany, and turns negative after about 15 trading days in the United Kingdom.

Baur and McDermott (2010) do further analysis of gold's hedging and safe-haven properties in international markets over the years 1979 to 2009. The results of that study indicate that gold is both a hedge and a safe haven for US stock markets and major European stock markets. However, there are some markets where it is less effective such as the markets in Australia, Canada, Japan and emerging economies.

This role of gold as a safe haven has received attention from other researchers such as Hood and Malik (2013). That study extends the sample period used by Baur and Lucy (2010) by five years to include the period around the 2008 financial crisis, and the results support that hypothesis that gold is both a hedge and safe haven. Smirnova (2016) explores the safe-haven properties of gold using a sample that includes the years of the financial crises. That study verifies the potential of an unlevered, positively correlated gold-based ETF for being a safe haven using a sample that begins with the introduction of such ETFs in 2004 to 2012.

It is true that Hood and Malik (2013) did not find evidence that silver and palladium can serve as hedges and safe havens. However, an earlier study using a longer time period by Hillier, Draper and, Faff (2006) provides positive results for the portfolio-enhancing properties of gold, silver and palladium in financial markets. Their sample is from 1976 to 2004, and the results indicate that all three metals have a low correlation with stock market index returns, and the metals can serve as hedges and as safe havens.

Clearly, there is an interest in determining the properties of gold and similar commodities for improving portfolio performance. Researchers have explored the effectiveness of gold using quite sophisticated analytical techniques and trading strategies. Our study offers two perspectives to the analysis of gold as a safe haven that, to our knowledge, are new to the literature. First, we recognize that ETVs offer investors with varying levels of sophistication a means for adding gold to a portfolio, and therefore, we employ a simple trading rule that most investors could understand and whose underlying premise is supported by academic research.

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Second, instead of branching out to other commodities and economies, we examine the relative effectiveness of the various ETVs that offer levered and inverse exposure to gold. For this initial study, we examine the effectiveness of gold only in the US market. The main goal is to provide insights into the relative usefulness of the various ETVs and the usefulness of the trend in developing new ETVs. The next section describes the data and the basic trading rule employed.

### 3. The Sample and Methodology

The goal of this paper is to investigate the usefulness of the various gold ETVs in a straightforward trading strategy that an average investor could easily understand and employ. The ETV market offers investors a spectrum of choices which, one could say, starts with a basic ETV like GLD that provides a positive and unlevered exposure to gold. Towards the other end of the spectrum of choices is an ETV like GLL, which offers a negative and levered exposure to gold. We will focus on four contrasting ETVs that have been available since 2008. These ETVs and the other data used in this study are described in more detail in this section.

GLD: SPDR Gold Trust issued by SPDR State Street Global Advisors ETF on November 18, 2004 with one-to-one (unlevered), positive exposure to gold.

DGZ: DB Gold Short ETN issued by Deutsche Bank on February 27, 2008 with one-to-one (unlevered), negative exposure to gold.

UGL: ProShares Ultra Gold issued by ProShares on December 1, 2008 with two-to-one (levered), positive exposure to gold.

GLL: ProShares UltraShort Gold issued by ProShares on December 1, 2008 with two-to-one (levered), negative exposure to gold.

SPY: SPDR S&P 500 ETF Trust with one-to-one (unlevered) exposure to the returns of the S&P 500 market portfolio.

IEF: iShares Trust - iShares 7-10 Year Treasury Bond ETF with one-to-one (unlevered) exposure to a portfolio of medium-term US Treasury bonds and notes.

VIX: S&P 500 volatility index.

	SPY	IEF	GLD	DGZ	UGL	GLL	VIX
Avg.	0.055%	0.015%	0.018%	-0.034%	0.014%	-0.089%	-0.054%
Std.Dev.	1.157%	0.452%	1.167%	1.178%	2.341%	2.313%	7.000%
Sharpe	0.0471	0.0339	0.0157	-0.0287	0.0057	-0.0386	-0.0077
T-stat	1.8302	1.3141	0.6075	-1.1151	0.2218	-1.4993	-0.2988
The t-statistic is for a test that the average of daily returns is zero. Only the return for SPY is significant at a 5% significance level in a one-tailed test.							

We use daily data over the sample period 2009-2014. The reason for choosing this period is that three of the ETVs did not become available until 2008. Starting the study in 2009 allows for an introductory period where the ETVs would become known; furthermore, the Great Recession ended early in 2009, so the study excludes data anomalies that may exist during period around the 2008 crisis. Choosing the end of the most recent calendar year when this study began, December 31, 2014, seemed like a natural, unbiased choice.

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All the data is provided by the CRSP data set. The univariate descriptive statistics are in Table 2, and the correlations and respective t-statistics are in Table 3. The results for Table 2 shows that only equities offer an average return that is significantly different from zero with a t-statistic for daily returns equal to 1.8302. Interestingly enough, the next-highest t-statistic in absolute value terms is -1.495 for GLL, which is the inversely-correlated, levered gold ETV. All of the gold-based ETVs have a significant correlation with SPY, IEF and the VIX.

<b>Table 3: Correlation Coefficients</b>						
	IEF	GLD	DGZ	UGL	GLL	VIX
SPY	-0.451	0.063	-0.053	0.064	-0.062	-0.765
IEF	1.000	0.150	-0.157	0.148	-0.154	0.379
GLD		1.000	-0.991	0.998	-0.997	-0.076
DGZ			1.000	-0.990	0.991	0.064
UGL				1.000	-0.996	-0.079
GLL					1.000	0.072
ACG						1.000
<b>T-statistics for Correlations</b>						
	IEF	GLD	DGZ	UGL	GLL	VIX
SPY	-19.6	2.4	-2.1	2.5	-2.4	-46.2
IEF		5.9	-6.2	5.8	-6.1	15.9
GLD			-290.6	686.0	-485.5	-3.0
DGZ				-269.8	280.9	2.5
UGL					-409.8	-3.1
GLL						2.8
All t-statistics are significant at a 1% significance level using a one-tail test.						

Previous researchers such as Hood and Malik (2013) and Ghazali, Lean and Bahari (2013) have explored the usefulness of gold as a safe haven in reaction to changing stock-market volatility. Therefore, we chose to use changes in the VIX as a signal for changing the portfolio weights in a stock/bond/ETV portfolio. Increases and decreases in the value of the VIX provide trading signals for increasing or decreasing exposure to gold and/or adding an inverse exposure to gold. For this initial study, we use the standard, moving-average methodology. The basic strategy is to increase exposure to gold and reduce exposure to equities when the VIX 20-day simple moving average (VIX-SMA20) crosses above the 50-day simple moving average (VIX-SMA50). We examine the results of increasing exposure using GLD and also the levered exposure from UGL. In addition to this, the manager could introduce a negative exposure using the DGZ and GLL when the VIX-SMA20 crosses below the VIX-SMA50. To round out the investigation, we examine the properties of returns generated from trading each of the ETVs on a stand-alone basis.

### 4. Findings

Our base portfolio, without gold, is a traditional 60/40 equity bond portfolio formed from SPY and IEF. In preliminary examinations we found that this was close to the optimal weights for this two-asset portfolio, and it represents a widely recommended allocation for the average investor. Furthermore, in our preliminary investigation concerning changing portfolio weights, we found that there was no benefit from decreasing the weight in bonds when increasing the weight in gold. This is not surprising since, as found on Table 3, the correlation between GLD and IEF returns is a positive and significant with a t-statistic equal to 5.90. The preliminary analysis also

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found that increasing the exposure to gold from 0% to 10% at the appropriate signal, and decreasing the exposure to equities from 60% to 50%, offered better results than other weights tried, e.g., 5%, 15%, and 20%. We also note that the 10% weight in gold is congruous with Grubb et al. (2010), which recommends a 9% weight in gold during market downturns. Since the goal is to examine if an average investor would have found gold-based ETVs useful to enhance the portfolio return, we decided to use the ad hoc choices of portfolio weights 60/40 and 50/40/10 for stocks/bonds/ETV, which we feel would be a likely, popular choice.

We also examine the results of alternating between a positive gold exposure and negative gold exposure. In other words, we examine the results of alternating between a 50/40/10 portfolio of SPY/IEF/GLD when the VIX-SMA20 is above the VIX-SMA-50 and a 50/40/10 portfolio of SPY/IEF/DGZ when the VIX-SMA20 is below the VIX-SMA-50. We apply the same strategy where we alternate between a SPY/IEF/UGL and SPY/IEF/GLL portfolio. The averages, standard deviations and Sharpe ratios for the various strategies are in Table 4. Table 4 also lists the statistics for the constant-weight portfolios 60/40 SPY/IEF, 60/40/10 SPY/IEF/GLD, and 60/40/10 SPY/IEF/UGL. The strategies are summarized here for better clarity. The rank of each pertains to the relative size of the Sharpe ratio with a rank of 1 being the highest.

- A (rank 4): 60/40 constant-weight portfolio in SPY/IEF.
- B (rank 2): 50/40/10 constant-weight portfolio in SPY/IEF/GLD.
- C (rank 1): alternating portfolio of 60/40/0 and 50/40/10 SPY/IEF/GLD, moving from the 60/40/0 to the 50/40/10 weights when the VIX-SMA20 breaks above the VIX-SMA50.
- D (rank 5): alternating portfolio of 50/40/10 SPY/IEF/GLD when the VIX-SMA20 breaks above the VIX-SMA50 and 50/40/10 SPY/IEF/DGZ when the VIX-SMA20 breaks below the VIX-SMA50.
- E (rank 3): 50/40/10 constant-weight portfolio in SPY/IEF/UGL.
- F (rank 6): alternating portfolio of 60/40/0 and 50/40/10 SPY/IEF/UGL, moving from the 60/40/0 to the 50/40/10 weights when the VIX-SMA20 breaks above the VIX-SMA50
- G (rank 7): alternating portfolio of 50/40/10 SPY/IEF/UGL when the VIX-SMA20 breaks above the VIX-SMA50 and 50/40/10 SPY/IEF/GLL when the VIX-SMA20 breaks below the VIX-SMA50

Portfolio C has the highest Sharpe ratio and earns rank 1, which indicates the active use of GLD as a safe haven is the best of the listed strategies. The return of Portfolio C is only slightly less than that of portfolio A, at rank 4, which is the constant 60/40/0 portfolio; however, the standard deviation is much lower. As found in previous studies, holding a constant position in gold, which is the strategy of portfolio B at rank 2, lowers volatility along with only a slight decline in return; therefore, the Sharpe ratio is higher than that of portfolio A. Using UGL instead of GLD as a safe haven when the VIX increases produces some benefits, and so portfolio F has rank 3, which is still higher than Portfolio A. Interestingly enough, Portfolio E with a constant-weight in SPY/IEF/UGL has relatively poor performance at rank 6. This is just above the lowest performance exhibited from Portfolio G which represents switching to a 10% weight in UGL when the VIX rises and then to a 10% weight in GLL when the VIX declines.

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As indicated by the results for portfolios D and G, using both the positive and negative ETVs lowers volatility the most; however, those strategies also sacrifice return substantially. The Sharpe ratios for these strategies are the lowest. We also found that using DGZ and GLL without GLD and UGL resulted in even worse performance, and we do not report it here.

Strategy:	A	B	C	D	E	F	G
	No gold	GLD only	GLD only	GLD & DGZ	UGL only	UGL only	UGL & GLL
SPY/IEF/ and ETV	60/40/0	50/40/10 constant	60/40/0 50/40/10	50/40/10 50/40/10	50/40/10 constant	60/40/0 50/40/10	50/40/10 50/40/10
Average	0.0388%	0.0353%	0.0383%	0.0315%	0.0346%	0.0377%	0.0273%
Std.Dev	0.6337%	0.5492%	0.5928%	0.5221%	0.5981%	0.6067%	0.5469%
Sharpe ratio	0.06128	0.06425	0.06454	0.06031	0.05781	0.06221	0.05000
Ranking	4	2	1	5	6	3	7

To round out our analysis, we examine the returns from trading the ETVs on their own. In the first examination, we use the VIX moving-average signals to buy and sell one share of each ETV. In the case of GLD and UGL, we buy one share on the first date the VIX-20SMA crosses above the VIX-50SMA on February 26, 2009, and sell it when it crosses below again on March 23, 2009. We repeat this process to the end of the sample. For GLD, the gross profit (no fees have been included) is \$9.18. For UGL, the gross profit is \$1.61. Based on the initial purchase prices of the ETVs, these nominal returns represent profits of 9.9% and 4.5% respectively, which annualize to about 1.9% and 0.88% respectively. We repeat the strategy using DGZ and GLL where, instead, we make our first purchase on March 23, 2009 when the VIX-20SMA crosses below the VIX-50SMA and sell when it crosses below on November 13, 2009. In both cases, the profits are negative: -\$5.36 (-5.5% annualized return) and -\$136.76 (-11.4% annualized return) respectively.

Strategy:	H	I	J	K	L	M
	Long only GLD	Active GLD	Active DGZ	Long only UGL	Active UGL	Active GLL
Average	0.0831%	0.0131%	-0.0296%	0.0134%	0.0005%	-0.0766%
St. Dev.	1.1668%	1.0684%	0.9753%	2.3393%	2.1024%	1.9148%
Sharpe	0.0717	0.0123	-0.0303	0.0057	0.0002	-0.0400
Rank	1	2	5	3	4	6
Corr with SPY	0.0629	0.0185	0.0020	0.0636	0.0186	0.0027
T-stat Corr	2.4416*	0.7151	0.0788	*2.4677	0.7221	0.1028

\* T-statistics for the correlation that are significant at the 1% level.

Table 6 has the statistics for the daily returns for each of these four strategies as well as for the strategies of being long in GLD and being long in UGL for the entire sample. For each of the active strategies, the returns are zero for the days when there is a zero holding, e.g., between March 23, 2009 and November 13, 2009 for GLD. Interestingly enough, being long GLD the entire sample has the best result. Buying gold at the beginning of the sample and selling at the end would have earned a return over twice that of the active strategy using GLD. A share of



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GLD sold for \$86.52 on January 1, 2009 and sold for \$114.08 on December 31, 2014 for a nominal return of \$27.56, which represents a 5.7% annualized return. The following list summarizes the strategies and provides the ranking based upon the value of the Sharpe ratio.

- H (rank 1): long GLD for the entire sample.
- I (rank 2): long GLD when the  $VIX-SMA_{20} > VIX-SMA_{50}$  otherwise zero.
- J (rank 5): long DGZ when the  $VIX-SMA_{20} < VIX-SMA_{50}$  otherwise zero.
- K (rank 3): long UGL for the entire sample.
- L (rank 4): long UGL when the  $VIX-SMA_{20} > VIX-SMA_{50}$  otherwise zero.
- M(rank 6): long GLL when the  $VIX-SMA_{20} < VIX-SMA_{50}$  otherwise zero.

The results on Table 5 indicate that while both GLD and UGL have positive and significant correlations with SPY, the active trading strategies using these ETVs dramatically reduces the correlations with SPY. The actively-traded series each have a correlation coefficient that is less than one-third of their respective, long-only positions and t-statistics less than unity. This supports the hypothesis that gold can serve as a safe haven.

### 5. Summary and Conclusions

We have verified that gold can improve portfolio performance. In particular, gold serves as a tool for enhancing returns when the VIX indicates market volatility is increasing. Also, the exotic products that provide variations of gold returns such as levered and inverse ETVs do not prove more useful than the simple, positively-correlated, unlevered return offered by GLD.

Gold itself has a significant, positive correlation with equities on average, but it is not constant. Holding gold in a constant proportion improves the risk-adjusted performance of a stock/bond portfolio, but the performance improves further with the active trading of GLD. A strategy of moving into gold when the VIX increases and not holding gold for lower values of the VIX does not lower the average, daily return very much (0.0388% to 0.0383%), but it lowers the standard deviation by a higher proportion (0.6337% to 0.5928%). When analysing the stand-alone returns of actively trading GLD, we found that moving in and out of GLD based upon movements in the VIX produced positive returns, on average, and those returns have a very low correlation with equity returns. This supports previous research that recognizes the importance of gold for lowering downside risk and its use as a safe haven.

These results concerning GLD are important because it points to a way that an average investor can improve the performance of a basic portfolio with a readily available ETV using an easily employed trading strategy. The results concerning the other ETVs are important, too, for several reasons. First, our results should serve as a cautionary note to investors and keep them from assuming that when they find that an unlevered ETV produces positive results, then, it should follow that a levered ETV will produce even better results. Investors could easily make other faulty assumptions concerning the use of negatively-correlated ETVs. Furthermore, financial institutions and regulators may wish to consider whether the offering of additional and sometimes exotic ETVs each year is really improving the industry. Is the increasing number and variety of ETVs providing value to investors?

With these initial findings, we can now move forward in a variety of ways. Increasing the sample size to include the calendar year 2015 is certainly on the agenda. Another logical step will be to investigate the results when other technical indicators are employed. We can also consider other tools such as the ETVs of other commodities such as silver. Finally, we can explore the ability of gold and other commodities to hedge other types of risk. This would build

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upon findings in Grubb et al., (2010) which indicate that a position in gold can hedge against extreme inflation scenarios and currency exchange-rate risk.

This has been an initial investigation into the use of ETFs and ETNs based on gold in routine portfolio management. The philosophy has been straightforward and basic, but that has also been the point in that the results can be relevant to investors with a wide range of sophistication levels.

### Endnotes

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<sup>i</sup>Several academic studies considered a link between precious metals, stock, bond and exchange rate markets, e.g., Sari, Hammoudeh, and Soytaş (2010); Hillier, Draper, and Faff (2006); and Baur and Lucey (2010) among others.

<sup>ii</sup>In contrast to using ETVs, before trading derivatives, brokerage firms require an investor to fill out additional forms and provide some evidence of their level of sophistication.

<sup>iii</sup>For a more detailed discussion of Value-at-Risk approach see S. Manganelli and R. Engle (Value at Risk Models in Finance. The European Central Bank Working paper No. 75, 2001); Basak and Shapiro (Value-at-Risk Based Risk Management: Optimal Policies and Asset Prices, Review of Financial Studies, 14 (2) 2001), among others.

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