



New Evidence on Whether Gold Mining Stocks Are More Like Gold or Like Stocks

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Introduction

The role of gold as an investment asset is a longstanding question of scholars and practitioners of portfolio management. Large changes in stock prices and gold prices in the past two decades have heightened this interest. An ancillary question related to the role of gold in an investment portfolio is the role of gold mining stocks. Are gold mining stocks actually part of the stock component of a portfolio, or are they just another way to hold gold? This is the question that we will answer. There is an existing literature, though not particularly large, that addresses the question posed. We see reasons to address this question once more. One reason is that the worldwide financial crisis and recession in 2007-2009 caused a large increase in the price of gold, and a large decrease in stock prices. Then, as the recession faded, these prices reversed direction. Large changes like this allow the opportunity to observe the relationship between stock prices and gold

prices when it likely matters most: when large price changes occur.

Also, exchange traded funds (ETFs) for gold, gold mining stocks, and a variety of stock portfolios have become available. As investable assets, ETFs provide a realistic picture of actual assets investors now use in practice, and are more likely to be used in the future. Because of this we use ETFs as our source of data. The use of recent data that encompasses the period before, during, and after the financial crisis and recession, combined with the use of ETF data, constructively advances the existing literature.

The paper is structured as follows. In section two, we review the related literature. This is followed in section three with a description and discussion of the data. Regression models to examine the relationship between gold mining stocks, gold, and stocks are presented in section four. Section five summarizes and examines what our results imply for portfolio management.

The Related Literature

There is a fairly large literature on gold as an investment asset. We are concerned with the return characteristics of gold mining stocks, not gold per se. This narrows considerably what we consider to be the relevant literature. Our empirical work is most similar to Tufano (1998). He estimated market model regressions in which the return on gold mining stocks was the dependent variable, and the return on gold, and the return on the stock market (the Center for Research in Security Prices NYSE/AMEX/Nasdaq composite value weighted index) were the explanatory variables. With data from January 1990 through March 1994, he estimated models with daily, weekly, and monthly data for 48 individual North American gold mining firms. His results using the traditional estimation procedure show that the mean betas on the gold return variable were 1.03, 1.41, and 1.88 for daily, weekly, and monthly data. The mean betas on the stock market return variable were -0.05, 0.27, and 0.48. Thus, it appears that gold mining stocks are far more sensitive to gold returns than they are to stock market returns. In other words, gold mining stocks are more like gold than like stocks. Moreover, the traditional betas on the stock market return variable are all well below one, with the daily return beta negative. Gold mining stocks with their low betas with the stock market would have a risk-reducing impact on the systematic risk of an overall stock portfolio. We note that the daily, weekly, and monthly betas differ in a non-trivial way. The phenomenon of betas varying with the period of return data warrants attention because choice of using only one return frequency (e.g., monthly) to estimate “the beta” may not be appropriate in light of the differences in beta estimates one can observe with different return frequencies.

We extend the approach used by Tufano to estimate beta values for gold mining stocks that differentiate beta values during bull and bear periods. We also assess whether gold and gold mining stocks are a hedge, diversifier, or safe haven. These three terms are defined in Baur and Lucey (2010). A hedge is an asset that, on average, is negatively correlated with a portfolio. A diversifier, on average, is positively, but not perfectly correlated, with a portfolio. A safe haven is uncorrelated or negatively correlated with a portfolio during times of market stress.

The other related literature is not concerned directly with whether gold mining stocks are more like gold or more like stocks. Instead, the concern is more with whether adding gold or adding gold mining stocks to a portfolio is preferred. In a sense, this is a related question. If gold stocks are more like stocks, then they will add little diversification benefits compared to adding gold. If gold mining stocks are more like gold, then they provide similar diversification benefits as gold and can serve as a substitute for gold. Moreover, if the returns on gold mining stocks exceed that of gold (but with similar correlation with stocks and similar standalone variability), then gold mining stocks would be preferred to gold. Knowing which situation is the case, of course, is important to actual portfolio management decisions.

Jaffe (1989) examined data from 1971 through June 1987. He used an index of gold stocks traded on the Toronto Stock Exchange, the return on gold bullion, and other financial assets (all measured in U.S. dollars). During this period, the mean return on gold mining stocks was 2.16%. This exceeded the return on gold of 1.56%, and the return on the S&P 500 of 1.06%. The correlation coefficients

between these three assets were: gold and gold mining stocks 0.645, gold and stocks 0.054, and stocks and gold mining stocks 0.304. From a risk reduction perspective the lowest correlation, between gold and stock, suggests that adding gold to a stock portfolio is preferred to adding gold stocks. The higher gold mining stock return as compared to the gold return, however, implies a tradeoff because gold mining stocks provide more return enhancement than gold. Jaffe shows that adding either gold or gold stocks to an existing portfolio improves the risk-return profile of the reconfigured portfolio.

Chua, Sock, and Woodward (1990) use monthly return data on gold, gold mining stocks (the Toronto Stock Exchange Gold Index), and the stock market (the Standard and Poor's 500 Index) from September 1971 through December 1988. A basic market model with only the stock market return as the independent variable was estimated for gold and for gold mining stocks as the dependent variables. The beta for gold is 0.11, and the beta for gold mining stocks is 0.86. The corresponding correlation coefficients are 0.050 and 0.345. The gold mining stocks show a much higher sensitivity to stock market returns than to gold returns. The sample is split into September 1971 to December 1979 and January 1980 to December 1988. For gold, the beta was 0.03 in the early period and 0.22 in the latter period. The correlation coefficient was 0.011 in the early period and 0.118 in the latter period. For the gold mining stocks, the beta was 0.57 in the early period, and 1.12 in the latter period. The correlation coefficient was 0.245 in the early period, and 0.424 in the latter period. The higher latter period correlation coefficient shows diminished diversification benefits of gold mining stocks. The beta of 1.12 suggests that adding gold mining stocks to a diversified stock portfolio (with a beta equal to one) would increase the systematic risk of this portfolio. This illustrates that correlations and betas for gold and gold mining stocks are far from constant over time. Because of the latter period result for gold stocks, the authors comment (p. 79): “Our results call into question, however, the benefit of diversifying with gold stocks...”

Conover, Jensen, Johnson, and Mercer (2009) examine daily data from January 1973 through December 2006. During this time, the annualized return on gold was 6.64% (standard deviation 20.90%). For gold stocks this was 11.22% (standard deviation 26.79%). U.S. stocks had a return of 10.83% (standard deviation 15.37%). The correlation of gold stocks with U.S. stocks was 0.05, and the correlation of gold with U.S. stocks was -0.03. These low correlations for both assets suggest large diversification benefits from either gold or gold equities. The large return difference in favor of gold stocks versus gold leads the authors to conclude (p. 76): “The investment benefits are considerably larger if the exposure to precious metals is obtained indirectly via an investment in the equities of precious metals firms, rather than directly by purchasing the precious metal as a commodity (e.g., gold bullion).”

As shown from the above review, the existing literature is not clear on whether investors are better served by adding gold or adding gold mining stocks to an existing portfolio. The results are sensitive to the sample period used. The recent heightened interest in gold and gold mining stocks by practitioners in portfolio management provides a further reason to present an up-to-date analysis. For example, in the practitioner journal *Financial*

<i>Daily data</i>					
	Mean	σ	Min	Max	N
R_{GDX}	0.011	2.772	-15.532	26.538	2,258
R_{GLD}	0.033	1.302	-8.781	11.291	2,258
R_{SPY}	0.032	1.340	-9.845	14.520	2,258
<i>Weekly data</i>					
R_{GDX}	0.016	5.429	-18.923	23.418	468
R_{GLD}	0.161	2.703	-9.220	13.805	468
R_{SPY}	0.144	2.667	-19.793	13.292	468
<i>Monthly data</i>					
R_{GDX}	0.036	110.74	-37.999	34.184	107
R_{GLD}	0.757	5.568	-16.140	12.787	107
R_{SPY}	0.586	4.479	-15.923	11.467	107

Exhibit 1: Summary Statistics

Source: Author's Calculations

R_{GDX} are the returns for the Market Vectors Gold Miners ETF, R_{GLD} are the returns for the SPDR Gold Shares, and R_{SPY} are the returns for the SPDR S&P 500 ETF Trust.

Planning, Day (2012) comments that gold rose sevenfold in the first five years of the recent gold bull market, while gold stocks only doubled. He offers numerous explanations for this divergence. One is the introduction of gold ETFs that track the price of gold, such as the SPDR Gold Trust. This fund has made obtaining an exposure to gold easy, and reduced the demand for using gold mining stocks as a way to obtain gold exposure. He mentions that gold stocks reflect the stock market as well as the gold price. Also, he claims that security analysts may have been too conservative in setting target prices for gold mining stocks because they have been too conservative in assumptions about the gold price used in their analyses.

Data and Summary Statistics

We examine the returns of three assets: gold, gold mining stocks, and a diversified portfolio of large capitalization U.S. stocks (the S&P 500). For each asset, we use ETFs that track the returns on the corresponding asset. ETFs are a fairly new financial market product. They allow investors to easily hold asset classes. From an academic perspective, ETFs are attractive to use in empirical research as they represent returns on investable asset classes.

There is no need to create portfolios to mimic what the returns to investors might have been. The ETFs are actual portfolios that can be and are held, so the returns precisely represent relevant returns. This is particularly appealing in the case of an ETF that invests in gold mining stocks. Early analysts had to create portfolios meant to mimic possible returns to holding gold mining stocks. GDX is the ticker symbol for an ETF of gold mining stocks, Market Vectors Gold Miners ETF. The GDX ETF measures what an investor seeking exposure to gold mining stocks would earn if the exposure is from holding this ETF. The GDX ETF holds 40 gold mining stocks and the underlying index is the NYSE ARCA Gold Miners Index, a modified market-capitalization weighted index. GLD is the ticker symbol for an ETF that tracks the market price of gold, SPDR Gold Shares. SPY is the ticker symbol for an ETF that tracks a portfolio of the Standard and Poor's index of 500 stocks, SPDR S&P 500 ETF Trust. These are all assets traded in the U.S., so the analysis is from the perspective of a U.S. investor.¹

The initial date that each ETF began trading was May 22, 2006 for GDX, November 18, 2004 for GLD, and January 29, 1993 for SPY. Therefore our period of analysis begins in May 2006. It ends in May 2015. We have 2,258 daily return observations, 468 weekly return observations, and 107 monthly return observations. Exhibit 4 shows the price evolution for GDX, GLD, and SPY over the sample period.

The price and dividend data were obtained from Yahoo! Finance. Returns were calculated for daily, weekly, and monthly data. The percentage return was calculated as:

$$R_t = [(P_t - P_{t-1} + D_t)/P_{t-1}] \times 100 \quad (1)$$

The closing prices (daily, weekly, and monthly) for each period t are denoted as P . The dividend per share in period t is D . The stock-holding ETFs (SPY and GDX) pay dividends, whereas GLD does not. Exhibit 1 shows the summary statistics for our return series, split into the daily, weekly, and monthly return frequencies. During this sample period, gold had a higher average return than stocks, and stocks had a higher return than gold mining stocks. In terms of variability measures, the gold mining stocks had a larger standard deviation of return (roughly twice) than either gold or stocks, which had similar standard deviations. Similarly, the minimum and maximum values of return show a much wider dispersion for the gold mining stocks than for both gold and stocks. So, during this period, gold mining stocks were inferior to gold or to stocks in terms of return, and also had higher risk when measured with standard deviation.

Exhibit 2 presents the correlation of returns across the three assets. With the daily return data, the correlation of gold mining stocks with gold is 0.76, and the correlation of gold mining stocks with the stock market is 0.35. With the weekly returns these are 0.80 and 0.29. With monthly returns these are 0.83 and 0.19. Gold mining stocks are far more correlated with gold returns than with stock returns. The implication is that gold mining stocks are more like gold than like stocks. We hasten to add, however, that the gold mining stocks do have a non-trivial positive correlation with stock returns, so both gold and stocks seem to explain gold mining stock returns. Notice that the correlation of gold with the

Full Correlation Matrix

Daily data

	R_{GDX}	R_{GLD}	R_{SPY}
R_{GDX}	1.0000		
R_{GLD}	0.7604	1.0000	
R_{SPY}	0.3468	0.0603	1.0000

Weekly data

	R_{GDX}	R_{GLD}	R_{SPY}
R_{GDX}	1.0000		
R_{GLD}	0.7604	1.0000	
R_{SPY}	0.3468	0.0603	1.0000

Monthly data

	R_{GDX}	R_{GLD}	R_{SPY}
R_{GDX}	1.0000		
R_{GLD}	0.8344	1.0000	
R_{SPY}	0.1885	0.0680	1.0000

Partial correlations of RGDX with RGLD and RDGT

Daily data

	Partial Correlation
R_{GLD}	0.7899
R_{SPY}	0.4643

Weekly data

	Partial Correlation
R_{GLD}	0.8315
R_{SPY}	0.4657

Monthly data

	Partial Correlation
R_{GLD}	0.83860
R_{SPY}	0.2397

Exhibit 2: Correlation Matrices

Source: Author's Calculations

R_{GDX} are the returns for the Market Vectors Gold Miners ETF, R_{GLD} are the returns for the SPDR Gold Shares, and R_{SPY} are the returns for the SPDR S&P 500 ETF.

stock market is 0.06, 0.02, and 0.07 for daily, weekly, and monthly returns (lower than the 0.35, 0.29, and 0.19 values of gold mining stocks with the stock market). Gold mining stocks and gold are both “diversifiers” with positive but low correlation, but gold clearly is the superior diversifier, with much lower correlations with stock returns. Neither gold, nor gold mining stocks are “hedgers” because neither has a negative correlation with the stock market.

In the lower part of Exhibit 2 we show the partial correlation coefficients of the gold stock returns with the gold return and the stock market return. These partial correlations will hold constant the other variable. So for example, the partial correlation coefficient of 0.79 of gold mining stocks with gold with the daily data holds constant the influence of the stock market return on the gold mining stocks. The partial correlation coefficient of 0.46 of gold stocks with the stock market with the daily data holds constant the influence of the gold return. These and all

the other partial correlations are higher than the analogous standard unconditional correlations. The simple correlations of gold mining stocks with gold, already high, are marginally higher when the partial correlation is considered. The simple correlations of gold mining stocks with the stock market, are much lower, and show larger increases in the partial correlation. This suggests a joint influence of both gold and the stock market on gold stock returns which we examine further in regression models.

Regression Models

We can now turn to the regression analyses of our data. Models 1 and 2 are simple bivariate regression models to judge the explanatory power of the stock market alone and the gold return alone in explaining gold mining stock returns (GDX).

$$\text{Model 1: } R_{GDX,t} = \alpha + \beta_1 R_{SPY,t} + \varepsilon_t \quad (2)$$

$$\text{Model 2: } R_{GDX,t} = \alpha + \beta_2 R_{GLD,t} + \varepsilon_t \quad (3)$$

When these typical market models are estimated with only the stock market return as the explanatory variable, the beta for gold mining stocks is 0.72 for daily returns, 0.60 for weekly returns, and 0.47 for monthly returns. All are statistically significant. With all of these coefficients below one, the interpretation is that gold mining stocks are stocks have less than average risk. The adjusted R-squared values are 0.12 for daily returns, 0.08 for weekly return, and 0.03 for monthly returns. A relatively small proportion of gold mining stock return variability is explained by stock market returns.

Model 2 shows the results when only the gold return is included. This models shows much higher beta values when gold is the explanatory variable than was the case for the stock market return: 1.62 for daily returns, 1.61 for weekly returns, and 1.66 for monthly returns. All are statistically significant. Gold mining stocks respond more than proportionately to a given gold return, with the magnitude of these betas similar to those reported by Tufano (1998). The adjusted R-squared values are much higher than they were for model 1: 0.58 for daily returns, 0.64 for weekly returns, and 0.69 for monthly returns. In sum, gold mining stocks are far more responsive to gold returns than to stock market returns, and gold returns alone explain gold mining stock returns far better than do stock market returns alone.

Model 3 enters both the stock market return and the gold return as independent variables to consider them jointly.

$$\text{Model 3: } R_{\text{GDX},t} = \alpha + \beta_3 R_{\text{SPY},t} + \beta_4 R_{\text{GLD},t} + \varepsilon_t \quad (4)$$

The model 3 results do not change the beta values obtained in models 1 and 2 in a substantial way. We note that both variables remain statistically significant in this expanded model. Given the model 1 and 2 results, this result was not unexpected.

Models 4 and 5 add interaction terms to models 1 and 2. In each case, the independent variable is used to create a dummy variable set equal to one if the return on the variable is positive (a “bull” period), and zero otherwise (a “bear” period). What this does is allow there to be beta coefficients during bull periods (when stock returns or gold returns are positive). This “bull beta” is the coefficient on the variable plus the coefficient on the interaction term. The “bear beta” is simply the coefficient on the non-interacted term variable. For example, with model 4, the bull beta is $\beta_5 + \beta_6$. The bear beta is simply β_5 . Models 5 and 6 coefficients are interpreted similarly. As before, we first look at stock market returns and gold returns separately, in models 4 and 5. Then, both variables are entered into model 6.

$$\text{Model 4: } R_{\text{GDX},t} = \alpha + \beta_5 R_{\text{SPY},t} + \beta_6 (R_{\text{SPY},t} * \text{BULL}_{\text{SPY},t}) + \varepsilon_t \quad (5)$$

$$\text{Model 5: } R_{\text{GDX},t} = \alpha + \beta_7 R_{\text{GLD},t} + \beta_8 (R_{\text{GLD},t} * \text{BULL}_{\text{GLD},t}) + \varepsilon_t \quad (6)$$

$$\text{Model 6: } R_{\text{GDX},t} = \alpha + \beta_9 R_{\text{SPY},t} + \beta_{10} R_{\text{GLD},t} + \beta_{11} (R_{\text{SPY},t} * \text{BULL}_{\text{SPY},t}) + \beta_{12} (R_{\text{GLD},t} * \text{BULL}_{\text{GLD},t}) + \varepsilon_t \quad (7)$$

Model 4 results regarding differences in bull and bear stock market betas are inconclusive. Using daily data, the bull beta is 0.629 (0.801 – 0.172), and the bear beta is 0.801. The p-value for the coefficient on the interaction term, however, is 0.105, so the statistical significance is marginal. Similarly with weekly and monthly data the interaction term coefficient is statistically insignificant, implying that the beta is statistically indistinguishable in bull and bear stock markets.

Model 5, with the daily data, shows that when gold is in a bull period, gold mining stocks have a gold bull beta of 1.778 (1.471 + 0.307). This is much higher than the gold beta in bear periods of 1.471. This is an economically significant result, and also a statistically significant (p = 0.000) result. With the weekly and monthly data this relationship no longer exists. The coefficient on the interaction term becomes statistically zero. Thus, whether the gold beta for gold mining stocks differs in bull and bear periods hinges on the return frequency used. A difference is apparent in the daily return data, but not in the weekly or monthly data.

Model 6 subsumes models 4 and 5. The daily data results again are not consistent with the weekly and monthly data results. In this model, the bull beta for SPY is 0.453 (0.813 + (-0.360)), which is much lower than the SPY bear beta of 0.813 for the stock return variable. The significant SPY interaction term coefficient shows that this difference is statistically significant. The gold bull beta is 1.869 (1.314 + 0.555), which is much higher than the bear beta of 1.314 for the gold return variable. This also is both economically and statistically significant. With the weekly and monthly returns none of the interaction terms are statistically significant.

One might presume that the daily results are more reliable. Daily frequency data are less subject to other confounding influences that can occur as the time frame of the return measurement is expanded to weekly or monthly. If the daily return results should be given more attention for this reason, it does appear to be the case that gold mining stock sensitivities are different depending on whether the stock market returns or gold returns are positive or negative. How might the results be interpreted? Factors that lead to high stock returns include increased investor optimism, and reduced risk aversion that increases demand for stock. These factors might have a more muted impact on gold mining stocks demand even with gold price effects accounted for, creating the observed different sensitivity to bull and bear markets. A higher gold return beta for bull gold markets would be consistent with investors knowing or perceiving that some gold mining firms hedge downward moves in gold prices. Firms could purchase of put options on gold, thus mitigating somewhat the impact of declines in gold prices (e.g., see Tufano, 1996). This could create a higher bull beta than bear beta with respect to gold prices.

For completeness and comparison purposes, we also estimated a few additional models. We estimated a model analogous to model 4 in Exhibit 3, but with the GLD substituted for GDX as the dependent variable. The interacted term was never statistically significant, so we do not show complete results. Thus, the bull and bear betas for gold are statistically indistinguishable. We also considered the “safe haven” aspects of gold and gold mining stocks. A safe haven asset would have positive returns when returns for the stock market are large and negative. We chose the fifth percentile or lower return values for the daily, weekly, and monthly stock market returns. Using this criterion, the number of significant market decreases in our sample period was 113 out of 2,258 observations for the daily data, 24 out of 468 observations for the weekly data, and 6 out 107 observations for the monthly data. These observations were classified with a dummy variable which was interacted with the stock market return. The interacted term and the stock market return are the independent variables in this model (analogous to model 4 in Exhibit 3). In this case, for an asset to be a safe haven, the coefficient on the interaction term

<i>Daily data</i>						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
R_{SPY}	0.717 (0.000)		0.625 (0.000)	0.801 (0.000)		0.813 (0.000)
R_{GLD}		1.619 (0.000)	1.580 (0.000)		1.471 (0.000)	1.314 (0.000)
$R_{SPY} * BULL_{SPY,t}$				-0.172 (0.105)		-0.360 (0.001)
$R_{GLD,t} * BULL_{GLD,t}$					0.307 (0.000)	0.555 (0.000)
<i>Adjusted R</i> ²	0.120	0.578	0.669	0.121	0.581	0.678
<i>Weekly data</i>						
R_{SPY}	0.597 (0.000)		0.569 (0.000)	0.596 (0.000)		0.558 (0.000)
R_{GLD}		1.606 (0.000)	1.597 (0.000)		1.656 (0.000)	1.566 (0.000)
$R_{SPY} * BULL_{SPY,t}$				0.001 (0.998)		0.029 (0.834)
$R_{GLD,t} * BULL_{GLD,t}$					-0.102 (0.555)	0.065 (0.679)
<i>Adjusted R</i> ²	0.084	0.639	0.717	0.082	0.638	0.716
<i>Monthly data</i>						
R_{SPY}	0.466 (0.052)		0.327 (0.013)	0.398 (0.336)		0.596 (0.014)
R_{GLD}		1.660 (0.000)	1.642 (0.000)		1.596 (0.000)	1.409 (0.000)
$R_{SPY} * BULL_{SPY,t}$				1.150 (0.841)		-0.515 (0.223)
$R_{GLD,t} * BULL_{GLD,t}$					0.117 (0.745)	0.444 (0.230)
<i>Adjusted R</i> ²	0.026	0.693	0.708	0.017	0.691	0.709

Exhibit 3: Market Vectors Gold Miners Models

Source: Author's Calculations

This Exhibit represents daily, weekly, and monthly time series regressions using the dependent variable, returns for the Market Vectors Gold Miners ETF (R_{GDX}). Statistical significance is determined by p-values provided in parentheses.

should be negative, and statistically significant, and the sum of the coefficients on the interacted term and the stock market return should be negative. Neither for gold nor for gold mining stocks do the conditions for a safe haven hold for any of the return data frequencies.

Conclusions and Implications for Portfolio Management

Are gold mining stocks more like gold or more like stocks? They are more like gold. What do these results imply for portfolio management? Because gold mining stock returns behave far more like gold returns than like stock returns suggests that the two are substitutes in an overall portfolio. Closer scrutiny implies that this is not necessarily the case. Suppose that an investor has an existing portfolio comprised solely of stocks, none of which are gold mining stocks. If the question posed is: "Should my overall portfolio include x% in gold in addition to the stock component, or should my overall portfolio include x% in gold mining stocks in addition to the stock component, or is either choice the same?" The answer our results point to is for gold to be added. The substantially lower correlation of gold with stocks than gold mining stocks with stocks implies that gold provides superior

diversification benefits. A caveat is that if the gold mining stocks provide a higher expected return than gold, this could outweigh gold's superiority as a risk-reducing asset in a portfolio when the overall risk-return profile is considered. While gold mining stocks could have higher returns than gold, as has happened in the past, in our period of analysis this was not the case. If the question posed instead is: "If my portfolio of stocks does not include gold mining stocks, and I cannot or will not hold any gold, should I add gold mining stocks?" The answer to that question is yes, gold mining stocks can provide a good, but not perfect substitute for holding gold in an overall portfolio.

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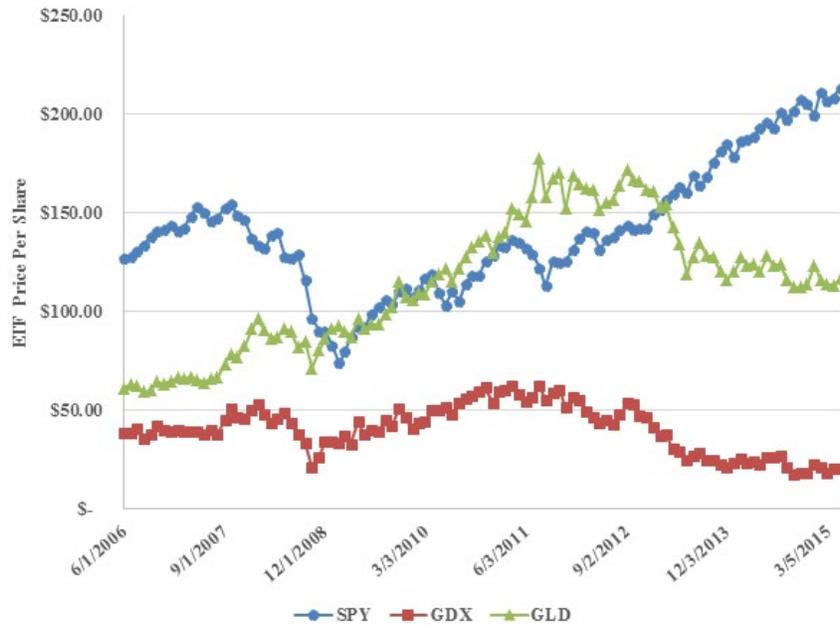


Exhibit 4: Time Series Graph

Source: Author's Calculations

This is a graph showing the price per share of the Market Vectors Gold Miners ETF (GDX), SPDR Gold Shares ETF (GLD), and the SPDR S&P 500 ETF Trust (SPY).

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Endnotes

1. Details are available at www.vaneck.com. For the GLD and SPY ETFs, details are available at www.spdrs.com and www.spdrgoldshares.com. At the suggestion of a reviewer we also examined a global stock portfolio instead of the U.S. only portfolio. When the SPDR Global Dow ETF (DGT) was used instead of SPY, the results were essentially the same. The correlation of returns between SPY and DGT during our sample period was 0.86, 0.94, and 0.94 for daily, weekly, and monthly return data. We report the results using the SPY ETF

Authors' Bios



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Mark A. Johnson is an Associate Professor of Finance in the Sellinger School of Business and Management of Loyola University Maryland. He has also served as a visiting faculty member at Wake Forest University. His research interests include financial markets, behavioral finance, consumer sentiment, financial literacy, and investments. He has contributed to media outlets such as Bankrate.com, FoxBusiness.com, The Daily Record, Baltimore Business Journal, and The Baltimore Sun. He holds a B.S. from Florida State University, M.S. degrees from Florida International University and the University of New Orleans, and a Ph.D. in Financial Economics from the University of New Orleans.

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