

Does Gold Act as a Hedge or a Safe Haven? Evidence from Pakistan

BISHARAT HUSSAIN CHANG, SURESH KUMAR OAD RAJPUT,
PERVEZ AHMED, and ZAFAR HAYAT

This paper seeks to determine whether in Pakistan gold protects investors against the risks associated with the exchange rate, oil shocks, and stock returns by testing the hedging and safe haven properties of gold returns for the period from August 1997 to May 2016. The analysis has been done to understand the relationship between moderate (normal) and extremely tumultuous conditions through least squares and DCC-GARCH models. The key results indicate that gold acts as a hedge against exchange rate risk only whereas it acts as a safe haven in terms of the risks associated with the oil, exchange rate and stock market shocks—thereby indicating that investors can potentially invest in gold to hedge against losses emanating from the exchange rate, while they may avoid potential losses originating from turmoil conditions in terms of the exchange rate, oil, and stock markets.

JEL Classification: E32, F31.

Keywords: Gold Returns, Safe Haven, Hedge, DCC GARCH

1. INTRODUCTION

Financial markets and instruments tend to grow rapidly both in volume and value (Baur & Lucey, 2010). This growth nevertheless comes with risks from the financial system, which at the same time drag the investors not only to hedge their investments but look for safe havens to avoid losses in case of extremely tumultuous conditions. Baur and Lucey (2010) specified that the investment vehicles that could act as a hedge (safe haven) are expected to have a significant negative relationship with other investment vehicles in normal conditions. This paper, thus, not only tries to understand the nature of the correlation of gold returns with oil, exchange rate, and stock returns in normal conditions but also under extremely tumultuous conditions for a developing country such as Pakistan—a country with relatively less developed and relatively volatile equity market (Qayyum & Kemal, 2006). There are very few studies that study the relationship between gold returns and risk. See, for example, Gürgün and Ünalmış (2014) and Iqbal (2017). Moreover, this analysis is important for a developing economy like Pakistan as the

Bisharat Hussain Chang is PhD Scholar, Sukkur Institute of Business Administration, Sukkur. Suresh Kumar Oad Rajput is Assistant Professor, Sukkur Institute of Business Administration, Sukkur. Pervez Ahmed is Assistant Professor, Sukkur Institute of Business Administration, Sukkur. Zafar Hayat <zafarhayat78@gmail.com> is Senior Economist, IMF, Islamabad.

Authors' Note: We are thankful to valuable comments of the participants and chair of the session of the First International Conference on Business, Economics and Education Management organised by the Sukkur Institute of Business Administration, Sukkur, Pakistan.

political and economic conditions of developing economies tend to be different from those of advanced economies, which also implies different risk and return profiles (Yusof & Majid, 2007).

We primarily focus on understanding the nature of the co-movements between the financial variables in normal and under extremely tumultuous conditions as the investors' reaction to gains and losses tends to be asymmetric (Kahneman & Tversky, 1979). For example, investors are usually more sensitive to losses than gains. Duxbury and Summers (2004) also emphasise that in general, financial agents prefer avoiding losses. Pointing to this phenomenon, Ang et al. (2005) noted that investors usually switch abruptly between assets under extreme conditions.

We consider gold as a leading candidate in the case of Pakistan as it has received extensive attention in the financial news (see, for example, Anand and Madhogaria, 2012; Beckmann & Czudaj, 2013; Beckmann et al. 2015). Adding gold to various hypothetical portfolios increases the average return and decreases standard deviation (Jaffe, 1989). Precious metals also performed very well during extreme market movements, which make them a candidate for providing a hedge against such conditions (Hillier et al. 2006). Baur and Lucey (2010) tested whether gold is a hedge or a safe haven and their findings suggest that gold serves a hedge against stocks in normal conditions and as a safe haven in extremely tumultuous stock market conditions. Baur and McDermott (2010), while examining the role of gold as a safe haven for major developed and emerging countries concluded that although gold is not a hedge or a safe haven for emerging stock markets, it is both a hedge and a safe haven for the U.S. and European stock markets.

Given the dearth of such literature for Pakistan, we test the relationship of gold returns with oil returns, using the real effective exchange rate and local gold prices (instead of international gold prices). We use the DCC-GARCH framework to investigate multivariate time-varying relationships. The results of our analysis indicate that gold acts as a hedge against exchange rate risk only. It plays the role of a safe haven against oil return, stock returns, and exchange rate return risks. We, therefore, conclude that investment in gold may hedge against losses, especially during declining oil, stock or foreign exchange market conditions.

The remainder of the paper is organised as follows: Section 2 briefly reviews the literature. Section 3 explains the data, its sources and stationarity properties while Section 4 introduces the econometric techniques. Section 5 discusses the results. Finally, Section 6 concludes the paper.

2. LITERATURE REVIEW

The literature is rich in exploring various dimensions of the relationship of gold with many important variables. For example, Wang and Lee (2011), Lucey et al. (2006), Faff and Hillier (2004), and Dooley et al. (1995) explored the impact of macroeconomic variables such as the exchange rate, interest rate, and output on gold prices whereas Aggarwal et al. (2014) and Koutsoyiannis (1983) attempted to predict y prices of gold. Smith (2002), Basu and Clouse (1993), and Tschoegl (1980), on the other hand, tested the market efficiency of gold. Beckmann and Czudaj (2013), Worthington and Pahlavani (2007), Levin et al. (2006), Ghosh et al. (2004), and Kolluri (1981) examined the effectiveness of the hedging property of the gold against inflation.

To answer whether gold returns act as a hedge and a safe haven against oil, stock, and exchange rate returns, Kaul and Sapp (2006), Michaud et al. (2006), Ciner (2001), Upper and Bundesbank (2001), Jaffe (1989) and Sherman (1986) studied the correlation between gold and other asset returns such as stocks, bonds, oil, and exchange rate. Several studies such as Baur and Lucey (2010) and Baur and McDermott (2010) explored the relationships while making explicit some definitional issues pertaining to a safe haven and hedge properties.

Reboredo (2013a) tested the role of gold as a hedge or safe haven against oil while Reboredo and Rivera-Castro (2014), tested the role of gold as a hedge and a safe haven against US dollar fluctuations. Reboredo (2013b) explored the hedging and safe haven properties of gold against the exchange rate. Recently, Iqbal (2017) focused on the hedging property of gold in a panel of countries, including Pakistan. His specification, however, does not account for an important variable, i.e. the impact of oil shocks, which is considerable in the case of Pakistan as it affects the overall macroeconomic activity and thereby macroeconomic variables.¹ We, thus, focus exclusively on Pakistan's case with an enriched macro-econometric specification by accounting for the role of the oil shocks and conduct the study using the latest available data. This also allows us to take into account structural breaks as it may have implications for the results.

3. THE DATA

The data on gold prices, stock prices, oil prices, and the real effective exchange rate covers the period from August 1997 to June 2016. The returns are calculated for each variable by taking the log difference and then multiplying the difference by 100. Equities are represented by closing prices of the KSE 100 Index, which are taken from the official website of Pakistan Stock Exchange (PSX) and are adjusted for both splits and dividends. Following Ciner et al. (2013), the real exchange rate has been used to measure the hedge and safe haven properties of gold against currency since the real exchange rate tells how much of goods and services in the domestic country can be exchanged for goods and services in a foreign one. The data of the real effective exchange rate has been obtained from the International Financial Statistics (IFS). The real effective exchange rate indicates the value of the local currency (PKR) against the basket of foreign currencies. It is measured in such a way that increases in the exchange rate indicate an appreciation of Pakistani currency. The data on gold is collected from the World Gold Council website and oil prices are taken from futures prices of the Brent crude oil contracts traded on the International Commodities Exchange (ICE).

Table 1 reports descriptive statistics and ADF test results.² The mean values in Table 1 indicate average monthly returns of the underlying variables. The average monthly stock returns, as measured by the KSE 100 Index closing prices, are the highest followed by returns on gold, whereas returns on the exchange rate are the lowest. Since the average monthly return on the exchange rate is positive, it indicates that, on average,

¹Basher and Sadorsky (2006) conducted an analysis to determine the effect of oil price shocks on emerging stock markets, including Pakistan. Their findings indicate significant effect of oil price shocks on stock market returns in the context of Pakistan as well. In the wake of their study, we investigate whether oil price and gold price returns are associated as well in normal and average conditions.

²We ran Augmented Dickey-Fuller (ADF) test to test the stationarity of the data in order to avoid spurious results. The results indicate that all variables are stationary after taking the first difference.

Table 1

Descriptive Statistics and ADF Test for Returns

	Exchange Rate	Gold	Oil	Stock
Mean	0.025%	1.020%	0.834%	1.282%
Std. Dev.	1.582%	3.908%	9.431%	8.860%
Skewness	-0.475	0.354	-0.709	-1.201
Kurtosis	4.999	4.018	3.739	8.124
Jarque-Bera	46.12***	14.52***	24.09***	301.6***
ADF test (level)	-1.668	-0.55	-1.664	1.727
ADF test (1 st difference)	-11.959***	-14.23***	-9.569***	-15.901***

Note: Jarque-Berra tests the normality of the data. The ADF test (level) and ADF test (1st difference) examine the stationarity of data at the level and the first difference respectively. ***, ** and * respectively indicate the significance at 1 percent, 5 percent and 10 percent levels.

the Pakistani currency is appreciating against a basket of currencies. Although oil markets show a low level of returns, its volatility as can be observed from the corresponding standard deviation is the highest, followed by the volatility in stock returns, hence indicating that both oil and stock markets are highly volatile in the context of Pakistan.

The skewness results for normality indicate that except gold returns, all others are negatively and significantly skewed, and large kurtosis coefficients indicate that the distribution of all the asset returns is non-normal (also see Jarque-Bera statistics).

Figure 1 presents conditional variances of gold, the exchange rate, oil, and stock returns. The latter were highly volatile during 1998–2000 and 2008–2010, which corresponds to the military takeover in Pakistan and the financial crisis. In contrast, gold returns in these periods tended to be relatively stable. Exchange rates exhibited relatively high volatility as compared to gold during 1997–2001, in 2008, and recently in 2014. Oil returns were relatively stable, however, they became higher after 2008 for almost two years and jumped again in 2014.

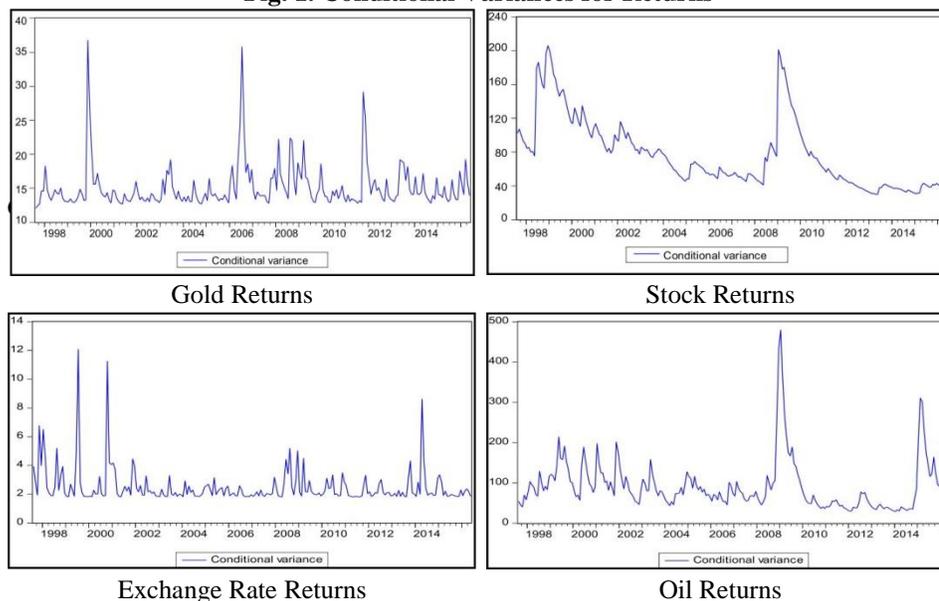
Fig. 1. Conditional Variances for Returns

Figure 1 presents the conditional variances in gold returns, exchange rate returns, oil returns and stock returns.

4. ECONOMETRIC METHODOLOGY

The main purpose of this study is to determine whether an investment in gold can protect from losses due to normal and extreme price changes in the exchange rate, oil or stock markets. The relationship during normal price changes tests the hedging property of gold, whereas the relationship during extreme price changes tests the safe haven property of gold. For this purpose, we use the following econometric approaches.

4.1. Least Squares Method

Consistent with Baur and Lucey (2010) and Ciner et al. (2013), we specify the following model:

$$\begin{aligned}
 r_{gold,t} = & a + b_1 r_{stock,t} + b_2 r_{stock,t(q20)} + b_3 r_{stock,t(q10)} + b_4 r_{stock,t(q5)} \\
 & + c_1 r_{opric,t} + c_2 r_{opric,t(q20)} + c_3 r_{opric,t(q10)} + c_4 r_{opric,t(q5)} + d_1 r_{erate,t} \\
 & + d_2 r_{erate,t(q20)} + d_3 r_{erate,t(q10)} + d_4 r_{erate,t(q5)} + e_t \quad \dots \quad \dots \quad (1)
 \end{aligned}$$

Where r_{gold} , r_{stock} , r_{opric} and r_{erate} denote the gold, stock, oil and exchange rate returns, respectively. The terms with parameter b_1 , c_1 , and d_1 test the hedging relationship of gold with stock, oil and exchange rate returns, respectively. In addition, the rest of the parameters test the safe haven dynamics where dummy variables have been created for interaction with respective variables. For example, $r_{stock,t(q20)}$, $r_{stock,t(q10)}$, and $r_{stock,t(q5)}$, are lower 20 percent, 10 percent and 5 percent quintiles for stock returns, respectively. To create these quintiles, dummy variables have been introduced where the dummy is equal to one if returns are respectively in the lowest 20 percent, 10 percent, and 5 percent threshold, and zero otherwise.

If there is a significant negative relationship of stock, oil and exchange rate returns with gold returns, investors may buy gold and prevent themselves from losses. However, if there is a nonsignificant negative relationship, the purchase of gold in such adverse conditions would have no benefit to the investors.

4.2. DCC- MGRACH Model

The aforementioned macro-econometric model (Equation 1) helps determine the nature of the relationship that holds in normal conditions. In the light of the possibility of structural breaks—which, if they exist, may potentially affect the results and change the nature of the relationship. We also try to determine whether there are some sub-periods for which the relationship between gold returns and other assets is negative, which changes thereafter and vice versa. For this purpose, we use the time-varying correlation measurement for understanding the time-varying relationship by using a dynamic conditional correlation (DCC) multivariate GARCH model proposed by Engle (2002).

The DCC-MGARCH approach has been widely used in the literature to find out the relationship between stock prices (Bali and Engle, 2010; Cai et al. 2009) and bond prices (Antonakakis, 2012), which is discussed below. The main advantage of the DCC approach is that it simultaneously focuses on time-dependent correlation and volatility of

n assets' returns. As specified in Lean and Teng (2013), the DCC-MGARCH model is based on the return series $r_{i,t}$ with the time-varying covariances, variances, and means for asset i at time t for which equations are given below:

$$r_{i,t} = \mu_{i,t} + \varepsilon_{i,t}, \text{ and } \mu_{i,t} = E(r_{i,t}|\Psi_{t-1}) = E_{t-1}(r_{i,t}), \varepsilon_{i,t}|\Psi_{t-1} \sim N(0, H_t).$$

The symbol Ψ_{t-1} indicates the information given in the last period. In the above expression $H_t = D_t R_t D_t$, shows the conditional variance-covariance matrix H_t , also known as conditional correlation estimator. D_t indicates the $(n \times n)$ diagonal matrix of conditional standard deviations at time t which is time-varying in nature. The mean equation derived from the GARCH (1, 1) model produces this conditional standard deviation for the asset returns. The conditional standard deviation for univariate GARCH (1, 1) is $D_t = \text{diag}(\sqrt{h_{i,t}})$, where $h_{i,t}$ denotes the conditional volatility for asset return i at time t since the conditional volatility is time-varying in nature. Hence, the expression $D_t = \text{diag}(\sqrt{h_{1,t}}, \dots, \sqrt{h_{n,t}})$ denotes D_t for a multivariate model, where $h_{i,t} = \tau_i + \alpha_i \varepsilon_{i,t-1}^2 + \beta_i h_{i,t-1}$. In the given expression, τ_i , α_i and β_i respectively indicate constant term, ARCH effect, and GARCH effect. If the coefficient of β_i is positive, it indicates that there is a persistent positive change as well as volatility clustering. A combination of α_i and β_i denotes that the volatility shock is persistent.

A conditional correlation matrix which is time-varying in nature is denoted by R_t where the conditional correlation coefficients of R_t are as follows:

$$R_t = \text{diag}[Q_t]^{-1} Q_t \text{diag}[Q_t]^{-1},$$

Where a conditional covariance matrix is:

$$Q_t \equiv [q_{ij}]_t = (1 - \alpha_{dcc} - \beta_{dcc})\bar{Q} + \alpha_{dcc}(\varepsilon_{t-1}\varepsilon'_{t-1}) + \beta_{dcc}Q_{t-1}.$$

where, \bar{Q} denotes the unconditional covariances of the standardised errors matrix, which is an $(n \times n)$ symmetric positive definite matrix, and $\varepsilon_t = (\varepsilon_{1,t}, \dots, \varepsilon_{n,t})'$ is the standardised residual terms. If the covariance is positive, it indicates that given variables move in the same direction, whereas if it is negative it indicates that the given variables move in the opposite direction. Positive covariance implies that the tested variables were strongly linked and moved in the same direction and vice versa.

Engle (2002) followed a GARCH (1, 1) process for any two asset returns to estimate the time-varying conditional correlation ($q_{ij,t}$):

$$q_{ij,t} = \bar{\rho}_{ij} + \alpha_{dcc}(\varepsilon_{i,t-1}\varepsilon_{j,t-1} - \bar{\rho}_{ij}) + \beta_{dcc}(q_{ij,t} - \bar{\rho}_{ij}),$$

In the expression given above, the unconditional correlation between $\varepsilon_{i,t}$ and $\varepsilon_{j,t}$ is denoted by $\bar{\rho}_{ij}$. $\rho_{ij,t} = \frac{q_{ij,t}}{\sqrt{q_{ii,t}q_{jj,t}}}$ is the correlation estimator. The following equations, therefore, show the computation of conditional correlation between $r_{i,t}$ and $r_{j,t}$.

$$\begin{aligned} q_{ij,t} &= E(\varepsilon_{i,t}\varepsilon_{j,t}|\Psi_{t-1}) = \frac{E(\varepsilon_{i,t}\varepsilon_{j,t}|\Psi_{t-1})}{\sqrt{E(\varepsilon_{i,t}^2|\Psi_{t-1})E(\varepsilon_{j,t}^2|\Psi_{t-1})}} \\ &= \frac{E(r_{i,t}r_{j,t}|\Psi_{t-1})}{\sqrt{E(r_{i,t}^2|\Psi_{t-1})E(r_{j,t}^2|\Psi_{t-1})}} = \text{Corr}(r_{i,t}r_{j,t}|\Psi_{t-1}) = \rho_{ij,t} = [R_t]_{ij}, \end{aligned}$$

Where the conditional correlation between asset return i and j at time t is $[R_t]_{ij} = \rho_{ij,t}$. The correlation estimator $\rho_{ij,t}$ for DCC (1, 1) can therefore be written as follows:

$$\rho_{ij,t} = \frac{(1 - \alpha_{dcc} - \beta_{dcc})\bar{q}_{ii} + \alpha_{dcc}\varepsilon_{i,t-1}\varepsilon_{j,t-1} + \beta_{dcc}q_{ij,t-1}}{\sqrt{((1 - \alpha_{dcc} - \beta_{dcc})\bar{q}_{ii} + \alpha_{dcc}\varepsilon_{i,t-1}^2 + \beta_{dcc}q_{ii,t-1})((1 - \alpha_{dcc} - \beta_{dcc})\bar{q}_{jj} + \alpha_{dcc}\varepsilon_{j,t-1}^2 + \beta_{dcc}q_{jj,t-1})}}$$

If the α_{dcc} and β_{dcc} are significant, as it indicates that DCC-MGARCH estimators are time-varying and dynamic. α_{dcc} indicates that standardised residuals are persistent from the last period since it indicates the volatility impact in the short-run. β_{dcc} indicates the shock impact in the long run where it indicates that the conditional correlation process is persistent. The coefficient of $\rho_{ij,t}$ indicates the strength of correlation whereas its sign shows the direction of correlation. If the value of $\rho_{ij,t}$ is positive, it indicates that the asset returns are positively correlated, whereas if its value is negative it indicates that the asset returns are negatively correlated; hence one asset can hedge against another one.

5. DISCUSSION OF RESULTS

Table 2 presents the findings related to the hedge and safe haven properties of gold against stocks, oils and exchange rate returns. Gold acts as a hedge and safe haven against these variables if the coefficients are negative and significant. The parameters b1, c1 and d1 test the hedging properties of gold whereas the rest of the parameters test the safe haven properties of gold against other variables. Safe haven properties of gold are tested at lower 20 percent, 10 percent and 5 percent quintiles as indicated with each coefficient in parentheses. The coefficients of stock returns are negative for all the parameters but are insignificant except for the 5 percent quintile, which shows that gold plays its role as a safe haven against stock returns, especially when the stock returns are lower than the 5 percent threshold. The results for oil returns are consistent with stock returns in the sense that they are negatively significant for 5 percent quintile only, implying that gold plays its role as a safe haven against oil returns when oil returns are lower than the 5 percent threshold. Finally, the coefficients of exchange rate returns indicate that gold prices increase significantly when there is a decrease in the exchange rate since the results are negatively significant for overall returns as well as for lower 10 percent and 5 percent quintiles in case of the exchange rate returns. Overall, these findings indicate that gold can hedge exchange rate risks only. In terms of the safe haven properties of gold, our results depict an interesting picture. Gold plays its role as a safe haven against all the variables while the impact being more pronounced in terms of the exchange rate risk.

Next, using the DCC GARCH framework, we examine dynamic correlations. Table 3 presents the results of the GARCH (1,1) and DCC models. The first three rows indicate the results of GARCH (1,1) for the variance equation whereas the last two rows indicate the DCC output. The GARCH results indicate that the constant coefficients of the mean equation are mostly insignificant, whereas the significant results for most of the other coefficients indicate that the equations are well specified.

Table 2
Estimation Results

		Coefficients	t-statistics
Stocks	b1 (hedge)	-0.021	-0.43
	b2 (20%)	-0.041	-0.26
	b3 (10%)	-0.02	-0.2
	b4 (5%)	-0.28	-1.69*
Oil	c1 (hedge)	0.079	1.67*
	c2 (20%)	0.001	0.01
	c3 (10%)	0.075	0.61
	c4 (5%)	-0.168	-1.77*
Exchange Rates	d1 (hedge)	-0.71	-2.65***
	d2 (20%)	0.61	0.83
	d3 (10%)	-0.32	-1.72*
	d4 (5%)	-0.63	-2.02**

Note: The results in this table examine the hedging and safe haven properties of gold with returns on other assets. ***, ** and * indicates the significance at 1 percent, 5 percent and 10 percent levels, respectively. b1, c1, and d1 are the parameters for testing hedging dynamics, whereas the rest of the parameters test safe haven dynamics that is how gold behaves in extremely turmoil conditions for oil, stock and exchange rate returns. 20 percent, 10 percent and 5 percent, indicate that the parameters are in 20 percent, 10 percent and 5 percent quintiles.

Table 3
GARCH (1,1) and DCC(1,1) Results of Gold and Other Asset Returns

$$\sigma_{i,t}^2 = \gamma_0 + \gamma_1 \sigma_{i,t-1}^2 + \gamma_2 \varepsilon_{i,t-1}^2$$

Coefficients	Oil	Stocks	Exchange Rate	Gold
γ_0	5.78 (1.31)	2.21 (1.38)	1.68*** (3.11)	14.89* (1.81)
γ_1	0.22*** (3.22)	0.07*** (3.66)	0.25*** (2.79)	0.13 (1.45)
γ_2	0.73*** (9.69)	0.89*** (26.15)	0.07 (0.32)	-0.12 (-0.20)
A	-0.038 (-1.546)	0.026 (0.511)	-0.0405*** (-9.93)	-
B	0.592 (0.965)	0.786*** (3.24)	-0.841*** (-9.68)	-

Note: Values in parentheses indicate t -statistic. ***, ** and * respectively indicate the significance at 1 percent, 5 percent and 10 percent levels.

The alpha DCC term indicates that in the short run there is no persistent relationship of gold with oil and stocks. The beta DCC shows that the conditional correlations process persists in the long run between gold and stock, and gold and exchange rates, where it is highly significant for the latter. Thus, we may conclude that the hedging (diversification) effect of gold against stocks and exchange rates are highly significant and persistent, but the same cannot be said for oil returns.

Figure 2 presents the dynamic conditional correlation of gold returns with stock, oil and exchange rate returns.

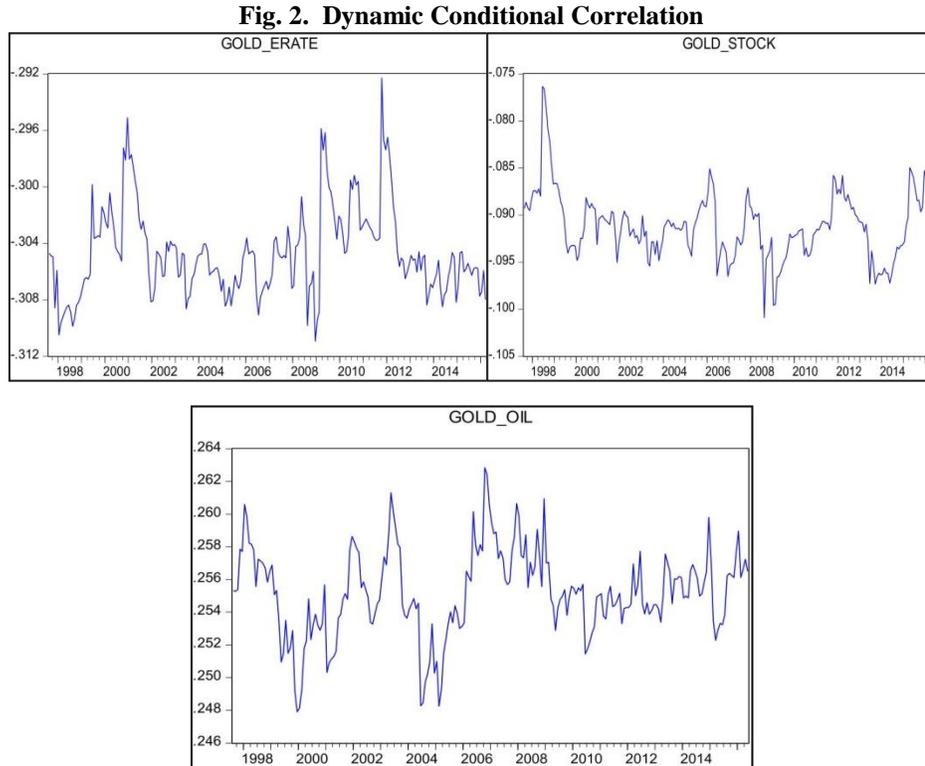


Figure 2 presents the dynamic conditional correlation of gold returns with stock, oil and exchange rate returns. The results indicate that the correlation between gold and exchange rate returns is negative and is around -0.31 , with slight changes observed during higher volatility regimes, which justify the hypothesis that gold acts as a hedge against exchange rate returns. This correlation slightly increased during the Asian financial crisis and after the 2008 global financial crisis.

Likewise, the correlation between gold and stock returns is negative but the strength of the correlation is lower, which is around -0.09 . Moreover, the correlation between these two returns further decreased during the Asian financial crisis. This change in the correlation of gold returns with stock and exchange rate returns during high volatility periods indicate that the correlations are sensitive to shocks. Finally, the correlation between gold and oil returns can be seen as positive for the whole sample indicating that gold cannot hedge against oil returns.

The possible reason for gold to play its role as a safe haven is that, in developing nations, gold has been more attractive than bonds, stocks, and bank deposits. People in developing nations usually consider gold a better choice for investment (Anand & Madhogaria, 2012). The findings of this study that gold plays the role of a safe haven against stock returns are consistent with the findings of Baur

and Lucey (2010) but against the findings of Ciner et al. (2013). The findings that gold is a hedge and a safe haven against the exchange rate are consistent with the findings of Ciner et al. (2013). A negative relationship between gold and exchange rate indicates that gold can hedge against exchange rate risk (Ciner et al. 2013). Finally, for oil returns as a case, this study provides results that are consistent with the findings of Reboredo (2013a) where he tested the role of gold as a hedge or safe haven against the oil by using a copulas-based approach and analysed that gold does not play its role as a hedge against oil price movements, however, it plays its role as a safe haven against oil price movements.

6. CONCLUDING REMARKS

This paper tests the safe haven and hedging properties of gold with oil, stock, and exchange rate returns in the context of Pakistan. Baur and Lucey (2010) state that an asset is a safe haven if it is negatively correlated or uncorrelated with another asset or portfolio of assets in extremely turmoil conditions and as a hedge if it is negatively correlated or uncorrelated with another asset or portfolio of assets in normal conditions.

We use the least square and DCC GARCH econometric estimation approaches to test the hedging and safe haven properties of gold with the exchange rate, oil, and stock market returns. In the least square, gold returns are regressed on overall stock, oil, and exchange rate returns and on 5 percent, 10 percent and 20 percent lower quintiles for each explanatory variable. To account for the time-varying correlation, DCC GARCH proposed by Engle (2002) is used in this study.

The results from the least-squares indicate that gold returns serve as a hedge against exchange rate risk only whereas it serves as a safe haven against oil returns, stock returns, and exchange rate returns' risk. We, therefore, conclude that there exists a stronger safe haven relationship of gold with foreign exchange markets than with the stock and oil markets. It may thus be suggested that choosing gold as an investment alternative, investors can avoid severe losses associated with foreign exchange, oil or stock markets.

REFERENCES

- Aggarwal, R., Lucey, B. M., & O'Connor, F. A. (2014). Rationality in precious metals forward markets: Evidence of behavioural deviations in the gold markets. *Journal of Multinational Financial Management*, 25, 110–130.
- Anand, R., & Madhogaria, S. (2012). Is gold a 'safe-haven'? an econometric analysis. *Procedia Economics and Finance*, 1, 24–33.
- Ang, A., Bekaert, G., & Liu, J. (2005). Why stocks may disappoint. *Journal of Financial Economics*, 76(3), 471–508.
- Antonakakis, N. (2012). *Dynamic correlations of sovereign bond yield spreads in the eurozone and the role of credit rating agencies' downgrades*. (MPRA Paper 43013). University Library of Munich.
- Bali, T. G., & Engle, R. F. (2010). The intertemporal capital asset pricing model with dynamic conditional correlations. *Journal of Monetary Economics*, 57(4), 377–390.
- Basher, S. A., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. *Global Finance Journal*, 17(2), 224–251.

- Basu, S., & Clouse, M. L. (1993). A comparative analysis of gold market efficiency using derivative market information. *Resources Policy*, 19(3), 217–224.
- Baur, D. G., & Lucey, B. M. (2010). Is gold a hedge or a safe haven? An analysis of stocks, bonds and gold. *Financial Review*, 45(2), 217–229.
- Baur, D. G., & McDermott, T. K. (2010). Is gold a safe haven? International evidence. *Journal of Banking & Finance*, 34(8), 1886–1898.
- Beckmann, J., Berger, T., & Czudaj, R. (2015). Does gold act as a hedge or a safe haven for stocks? A smooth transition approach. *Economic Modelling*, 48, 16–24.
- Beckmann, J., & Czudaj, R. (2013). Gold as an inflation hedge in a time-varying coefficient framework. *The North American Journal of Economics and Finance*, 24, 208–222.
- Cai, Y., Chou, R. Y., & Li, D. (2009). Explaining international stock correlations with CPI fluctuations and market volatility. *Journal of Banking & Finance*, 33(11), 2026–2035.
- Ciner (2001) On the long-run relationship between gold and silver prices a note. *Global Finance Journal*, 12(2), 299–303.
- Ciner, Gurdgiev, C., & Lucey, B. M. (2013). Hedges and safe havens: An examination of stocks, bonds, gold, oil and exchange rates. *International Review of Financial Analysis*, 29, 202–211.
- Dooley, M. P., Isard, P., & Taylor, M. P. (1995). Exchange rates, country-specific shocks, and gold. *Applied Financial Economics*, 5(3), 121–129.
- Duxbury, D., & Summers, B. (2004). Financial risk perception: Are individuals variance averse or loss averse? *Economics Letters*, 84(1), 21–28.
- Engle, R. (2002). Dynamic conditional correlation: A simple class of multivariate generalised autoregressive conditional heteroskedasticity models. *Journal of Business & Economic Statistics*, 20(3), 339–350.
- Faff, R., & Hillier, D. (2004). An international investigation of the factors that determine conditional gold betas. *Financial Review*, 39(3), 473–488.
- Ghosh, D., Levin, E. J., Macmillan, P., & Wright, R. E. (2004). Gold as an inflation hedge? *Studies in Economics and Finance*, 22(1), 1–25.
- Gürgün, G., & Ünalımsı, İ. (2014). Is gold a safe haven against equity market investment in emerging and developing countries? *Finance Research Letters*, 11(4), 341–348.
- Hillier, D., Draper, P., & Faff, R. (2006). Do precious metals shine? An investment perspective. *Financial Analysts Journal*, 62(2), 98–106.
- Iqbal, J. (2017). Does gold hedge stock market, inflation and exchange rate risks? An econometric investigation. *International Review of Economics & Finance*, 48, 1–17.
- Jaffe, J. F. (1989). Gold and gold stocks as investments for institutional portfolios. *Financial Analysts Journal*, 45(2), 53–59.
- Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263–291.
- Kaul, A., & Sapp, S. (2006). Y2K fears and safe haven trading of the US dollar. *Journal of International Money And Finance*, 25(5), 760–779.
- Kolluri, B. R. (1981). Gold as a Hedge against Inflation—an Empirical-Investigation. *Quarterly Review of Economics and Business*, 21(4), 13–24.

- Koutsoyiannis, A. (1983). A short-run pricing model for a speculative asset tested with data from the gold bullion market. *Applied Economics*, 15(5), 563–581.
- Lean, H. H., & Teng, K. T. (2013). Integration of world leaders and emerging powers into the Malaysian stock market: A DCC-MGARCH approach. *Economic Modelling*, 32, 333–342.
- Levin, E. J., Montagnoli, A., & Wright, R. (2006). *Short-run and long-run determinants of the price of gold*. London, UK: World Gold Council
- Lucey, B. M., Poti, V., & Tully, E. (2006). International portfolio formation, skewness & the role of gold. *Frontiers in Finance and Economics*, 3(1), 49–68.
- Michaud, R., Michaud, R., & Pulvermacher, K. (2006). Gold as a strategic asset. World Gold Council.
- Qayyum, A., & Kemal, A. R. (2006). *Volatility spillover between the stock market and the foreign exchange market in Pakistan*. Islamabad, Pakistan. (PIDE Working Paper Series Paper No. 2006:7).
- Reboredo, J. C. (2013a). Is gold a hedge or safe haven against oil price movements? *Resources Policy*, 38(2), 130–137.
- Reboredo, J. C. (2013b). Is gold a safe haven or a hedge for the US dollar? Implications for risk management. *Journal of Banking & Finance*, 37(8), 2665–2676.
- Reboredo, J. C., & Rivera-Castro, M. A. (2014). Can gold hedge and preserve value when the US dollar depreciates? *Economic Modelling*, 39, 168–173.
- Sherman, E. J. (1986). *Gold investment: theory and application*. Prentice Hall.
- Smith, G. (2002). Tests of the random walk hypothesis for London gold prices. *Applied Economics Letters*, 9(10), 671–674.
- Tschoegl, A. E. (1980). Efficiency in the gold market—a note. *Journal of Banking & Finance*, 4(4), 371–379.
- Upper, C., & Bundesbank, D. (2001). How safe was the “safe haven”? financial market liquidity during the 1998 turbulences. Available on the BIS website (www.bisp.org). 241.
- Wang, K.-M., & Lee, Y.-M. (2011). The yen for gold. *Resources Policy*, 36(1), 39–48.
- Worthington, A. C., & Pahlavani, M. (2007). Gold investment as an inflationary hedge: Cointegration evidence with allowance for endogenous structural breaks. *Applied Financial Economics Letters*, 3(4), 259–262.
- Yusof, R. M., & Majid, M. S. A. (2007). Macroeconomic variables and stock returns in Malaysia: An application of the ARDL bounds testing approach. *Savings and Development*, 449–469.