DO PRECİOUS METALS AND THE US DOLLAR ACT AS SAFE-HAVEN ASSETS FOR BRICS STOCK MARKETS?

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Abstract:
Our paper investigates the role of precious metals and the US dollar as safe-haven and hedge assets for BRICS (Brazil, Russia, India, China, India, and South Africa) stock markets. We employ the multivariate factor stochastic volatility (MFSV) model to examine the time-varying relationship between precious metals, US dollar returns, and BRICS broad stock market returns. The model captures dynamic volatility interactions and the potential safe-haven relationship in the BRICS stock markets over 20 years (2005-2025). We find that the BRICS stock market behavior show similar patterns , and we distinguished three main factors that shape the relationships between the precious metals, the US dollar, and BRICS stock markets. To investigate the safe-haven effect, we use the Baur and Lucey (2010) regression model with drawdown measures as dummy variables. The results demonstrate that precious metals display safe haven characteristics for the BRICS stock markets, but to different extents, while the US dollar acts as a hedge asset.

***Keywords*:** precious metals, US dollar, safe-haven, hedge, BRICS, broad market stock indices, stochastic volatility, drawdown, CDaR

INTRODUCTION

A safe-haven asset is an investment that is expected to retain or increase in value during times of market downturns or crises, enabling investors to protect their portfolios(Baur & McDermott, 2010). Several assets are labelled safe havens, in most cases, gold and other commodities, debt instruments, currencies, and cryptocurrencies (Będowska-Sójka & Kliber, 2021).

Historically, silver, platinum, and palladium were seen as metals used for industrial purposes, whilst gold and silver have been viewed as metals with both industrial and investment properties. Since the launch of platinum and palladium Exchange Traded Funds (ETFs), there has been a shift in the use of these precious metals from industrial assets to investment assets (Fassas,2012). Another reason for the increasing popularity of precious metal investments is due to increasing financial market volatility. This is attributed to events such as the Global Financial Crisis (GFC) (Arif et al., 2019) and the COVID-19 pandemic (Farid et al., 2021). The increased volatility has encouraged investors to look for safe-haven assets to diversify their investment portfolios (Akhtaruzzaman et al., 2021). According to Baur & Lucey (2010), an asset is considered a safe-haven where it is negatively correlated or uncorrelated with a different security or portfolio in times of economic turmoil. The defining characteristic is a zero or negative correlation during bearish periods, however, during bullish or normal periods, the correlation could be negative or positive.

Gençyürek & Ekinci (2023) demonstrate that precious metals (particularly gold and silver) serve as assets with diversifying benefits among the financial markets of the BRICS-T (Brazil, Russia, India, China, India, South Africa, and Turkey) nations. Moreover, they suggested that investors should increase their weight of precious metals, apart from gold, during periods of market turmoil as a risk management tool.

Likewise, Kangalli Uyar et al. (2021) indicate that the number of precious metal assets that demonstrated safe-haven characteristics increased during theCOVID-19 pandemic relative to the 2007-2008 Financial Crisis. Moreover, the number of precious metals acting as safe-haven assets increased with the severity and length of shocks . Lastly, during the market turmoil, only gold was found to have strong hedging properties. More recently, Mensi et al. (2023) demonstrated that gold was a weak safe-

haven for to the S&P 500 over the short-term (1 to 8 days). However, gold was a strong safe-haven over the long-term (8 to 256 days), whilst silver demonstrated the opposite. Moreover, platinum was a weak safe-haven for both long- and short-term periods.

Some currencies could also fulfill the role of safe-haven assets. A list of safe-haven currencies is compatible with the list of main reserve currencies, with the US dollar being the strongest (Ming et al., 2023). (Some other examples of safe-haven currencies include the Swiss franc and the Japanese yen (Feder-Sempach et al., 2024). They are liquid currencies of countries with relatively low inflation and stable political systems. They used to have a low or negative correlation with the stock market indices of European countries and the US, making them useful for hedging and mitigating the risk (Le Thi Thuy et al., 2024).

The motivation for our study is the fast-growing financial interdependence of the contemporary globalized world, and the potential growth of the BRICS countries affecting international financial markets. Some international investors may observe a negative dependence between the precious metals, mainly gold and the stock market. In that event, foreign investment may be more appealing to equity portfolio managers wanting to profit from significant economic and financial growth in the BRICS countries (Kumar et al., 2021). Hence, our paper offers a new perspective by analyzing the safe haven and hedging properties of precious metals and the US dollar for BRICS stock markets over the last 20 years. Some asset managers and individual investors make use of precious metals and currencies as components of their investment portfolios (Lahiani et al., 2021). We aim to contribute to the approaches applied to the methodologies for identifying safe-haven and hedge assets .

The main objective of our paper is to examine the safe-haven properties of gold, silver, platinum, palladium and the US dollar over twenty years to hedge the portfolio of five BRICS stock market indices. We assume that precious metals and the US dollar could act as safe havens or hedges for stocks of major BRICS countries. To answer this question, we use the MSV model and the Baur & Lucey (2010) regression model with drawdown measures as dummy variables to capture extreme market conditions. Chekhlov et al., (2005) proposed drawdown at risk (DaR) and conditional drawdown at risk (CDaR) as better risk measures to capture extreme market conditions, (Ding et al., 2022). Our findings can provide useful information for international investors on the type of safe-haven assets that can protect investments in times of economic uncertainty and unforeseen global events. The results demonstrate that precious metals display safe haven characteristics for the BRICS stock markets, but to different extents, while the US dollar acts as a hedge asset.

METHODOLOGY

Our main research question explores whether precious metals and the US dollar have the potential to behave as safe-haven or hedge assets for the major stock market indices of BRICS countries.

In our research, we use daily closing prices from May 2005 to April 2025 for the BRICS main stock market indices: Sao Paulo Bovespa Index (.BVSP), MOEX Russia Index (.IMOEX), S&P BSE SENSEX Index (.BSESN), the Chinese CSI 300 Index (.CSI300), and FTSE/JSE Africa All Shares Index (.JALSH). Precious metals and the US dollar are used as potential safe-haven assets: Gold (XAU=), silver (XAG=), platinum (XPT=), palladium (XPD=) and the US Dollar Index (.DXY). All asset prices are denominated in US dollars, and the data was obtained from the LSEG EIKON Database.

We use the multivariate factor stochastic volatility model introduced by Chib et al. (2006), and refined via Bayesian inference by Kastner et al. (2017). This model combines a multivariate stochastic volatility model with factor analysis. which allows us to reduce the high-dimensional observation space to a lower-orthogonal latent factor space and simultaneously model features of financial time series such as volatility clustering or time-varying correlations.

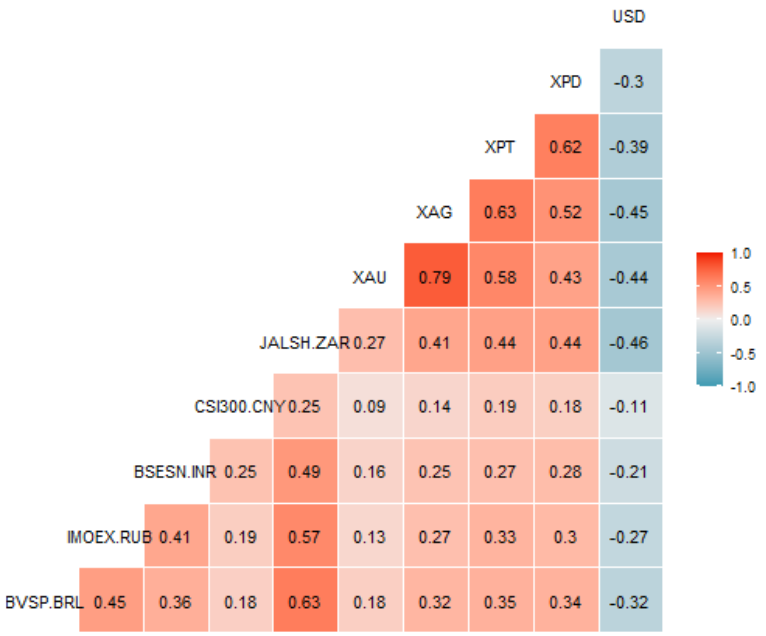

Figure 1. Correlogram of the time series used in the study
Source: Own work.

In our study, we use the methodology proposed by Baur & Lucey (2010) and apply the following regression model with dummy variables to capture extreme stock market movements.

$$\boldsymbol{r_{k,t} = a + b_1 r_{M,t} + C_1 + r_{M,t(q=0.05)} + C_2 + r_{M,t(q=0.025)} + C_3 + r_{M,t(q=0.01)} + e_t,} \quad (1)$$

where $r_{k,t}$, $r_{M,t}$ are the returns of precious metal and market indices, and the US dollar respectively. The terms $r_{M,t(q)}$ account for asymmetries of negative (extreme) shocks. $r_{M,t(q)}$ are dummy regressors that contain market returns that are in the q% lower quantile, such as the 5%, 2.5% and 1% quantile. If the return is larger than the q% quantile, the value of $r_{M,t(q)}$ is zero.

Following Baur & Lucey (2010), we interpret the hedge effect when estimates of b_1 is significant and negative, and the safe-haven effect when the sum of significant estimates of b_1 and c_1, c_2, c_3 from Equation (1) is negative.

Finally, to better capture the arrival of new information into the markets we assume error term e_t follows the asymmetric GJR-GARCH(r,s) process of Glosten et al. (1993):

$$h_t = \alpha + \sum_{i=1}^{r} \beta_i e_{t-i}^2 + \sum_{i=1}^{r} \gamma_i e_{t-i}^2 D(e_{t-i} > 0) + \sum_{j=1}^{s} \delta_j h_{t-j} \quad (2)$$

with the error term distributed as a Generalized error distribution (GED).

We propose to use the following regression model with dummy variables to capture extreme market drawdowns:

$$r_{k,t} = a + b_1 d_{M,t} + c_1 d_{M,CDaR(\alpha=0.1)} + c_2 d_{M,CDaR(\alpha=0.05)} + c_3 d_{M,CDaR(\alpha=0.01)} + e_t, \quad (3)$$

The main difference is the replacement of the quantile returns on the right-hand side of the equation with drawdown measures. Drawdown measures are used in finance to assess the decline from a historical peak in the value of an investment portfolio. This means that we test whether the returns of the candidate for safe-haven and/or hedge are negatively correlated with the drawdown of the stock index (representing the market in a given country). Dummy variables are also calculated analogously: $d_{M,CDaR(\alpha=0.01)}$ is a dummy regressor that contain the 1% biggest drawdown in market returns (when at

time *t* the drawdown is one of the 1% biggest market drawdowns the value of the regressor is equal to this drawdown or otherwise it is equal to zero).

FINDINGS

This section discusses the estimated results from the multivariate factor stochastic volatility model, allowing us to investigate the roles of precious metals and the US dollar as safe havens and hedges for BRICS stock indices. Furthermore, factor loading analysis allows us to identify the relationship between precious metals and the US dollar and BRICS stock market indices. This section consists of four steps, a–d:

a. exploration of factor loading,
b. factor volatility analysis,
c. time-varying correlation analysis, and
d. study of safe haven and hedge properties.

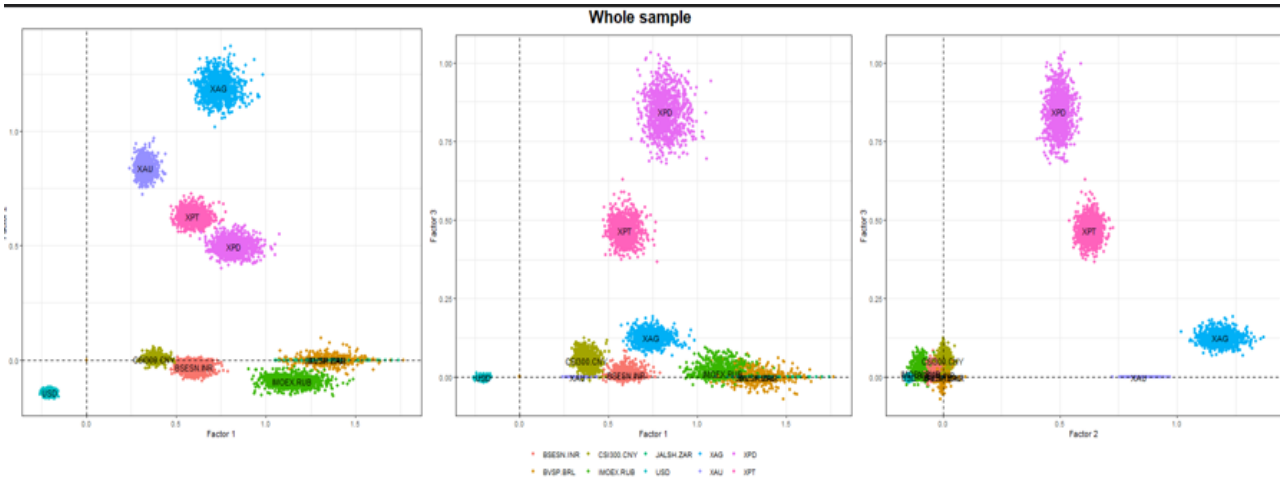

Figure 2. Two-dimensional posterior distributions of factor loadings
Source: Own work.

Figure 2 shows that the US dollar behaves differently from other precious metals. The first latent factor determines the BRICS stock markets' behavior. The second latent factor is mainly related to precious metals, and the third latent factor is linked with silver, platinum, and palladium but not gold, which highlights the different role of gold in comparison to other precious metals.

The aggregate results show that none of the precious metals could act as a hedge asset against BRICS stock markets, but the US dollar could. This statement should be supported by the fact that the US dollar behaves differently from other precious metals based on the factor loading analysis. The overall outcome indicates that the safe-haven function of all precious metals works for all BRICS stock exchange markets, excluding Russia. The Russian index could be hedged by silver, platinum, and palladium, but not gold. The US dollar can serve as a safe-haven function in the stock markets of India, China, Russia and South Africa.

Table 1. Estimation results for the Baur and Lucey (2010) model for FTSE/JSE Africa All Shares Index (.JALSH).

JALSH.ZAR	XAU			XAG			XPT			XPD			USD		
	Coeff. est.	t-stat.	pvalue	Coeff. est.	t-stat.	pvalue	Coeff. est.	t-stat.	pvalue	Coeff. est.	t-stat.	pvalue	Coeff. est.	t-stat.	pvalue
b_1	0.1786	24.4879	0.0000	0.368	30.354	0.0000	0.3539	22.8527	0.0000	0.4457	29.7946	0.0000	-0.1186	-29.1217	0.0000
c_1(0.05)	-0.0335	-6.7365	0.0000	-0.0552	-8.9835	0.0000	0.0104	0.2113	0.8326	-0.0498	-3.0719	0.0021	-0.0251	-1.8367	0.0663
c_2 (0.025)	0.0141	1.6919	0.0907	0.068	7.3524	0.0000	0.0255	0.3495	0.7267	0.0351	1.2449	0.2132	0.0545	9.6719	0.0000
c_3 (0.01)	-0.0426	-1.1557	0.2478	-0.0021	-0.1143	0.909	-0.0854	-0.9295	0.3526	0.023	0.6869	0.4922	-0.0012	-0.0396	0.9684
ω	0.0124	3.474	0.0005	0.0302	3.2899	0.001	0.0303	3.957	0.0001	0.0672	2.8653	0.0042	0.0015	3.8925	0.0001
α_1	0.0677	6.3349	0.0000	0.0618	6.4073	0.0000	0.0626	5.9008	0.0000	0.0654	5.0473	0.0000	0.0328	7.1426	0.0000
β_1	0.9429	113.0017	0.0000	0.9478	124.7208	0.0000	0.93	104.6044	0.0000	0.9253	62.1588	0.0000	0.9595	562.7678	0.0000
γ	-0.039	-3.7251	0.0002	-0.0336	-3.5156	0.0004	-0.0111	-0.9206	0.3573	-0.0117	-0.977	0.3286	0.0015	0.199	0.8422
δ	1.1557	35.2772	0.0000	1.1233	35.6027	0.0000	1.3124	35.2551	0.0000	1.1952	35.194	0.0000	1.363	33.0608	0.0000

Source: Own work.

CONCLUSIONS

This article explored the safe-haven and hedge properties of four precious metals, gold, silver, platinum, and palladium, and the US dollar for investors investing in BRICS stock exchanges. In view of the low or even negative correlation between precious metals and stock markets, and the rising interest of the commodity markets after the COVID-19 pandemic period, it warrants the examination of the performance of precious metals during times of market turmoil. Our preliminary findings support the use of precious metals as safe havens in the event of market turmoil, and the US dollar as hedge for the BRICS stock markets.

Our findings indicate possible diversification benefits for investors in BRICS stock markets, and fund managers and other market participants by highlighting the US dollar hedging and precious metals safe-haven characteristics in the portfolio allocation process. Future research could consider a greater number of BRICS economies and rare precious metals as potential safe-haven assets.

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