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POLICY BRIEF

YOUNG ECONOMISTS' PERSPECTIVE

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Hedging Nickel and Copper Commodities using Bitcoin and Gold: Are they Safe Havens?

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The Philippine economy exports substantial amounts of nickel and copper to neighboring nations, which accentuates the country's abundant mineral resources. The aforementioned metal commodities are consistently subjected to the pervasiveness of economic and political uncertainty that heightens the asset's volatility. As a result of nickel and copper's proclivity to deviate significantly, there exists a demand for a safe haven where Philippine exporters may utilize risk-reduction instruments. Gold is traditionally known for its hedging capabilities against different economic uncertainties, and with the development of Bitcoin, several studies have shown the cryptocurrency's ability to hedge. Therefore, the study determines if Bitcoin and gold are a safe haven, hedge, or diversifier for nickel and copper to provide accessible hedging instruments that could potentially offset extreme price risks. Existing literature has predominantly focused on Bitcoin and gold's hedging capabilities in different financial markets, yet there exists a significant gap in terms of examining hedging instruments for the commodity market. Parametric models (i.e., DCC-GARCH, ADCC-GARCH, and ADCC-GJR-GARCH) and non-parametric models (i.e., QQ Regression and Wavelet Coherence Analysis) were applied to take into factor the robustness of more recent methodologies in terms of addressing the heterogeneity problem. The study concluded that Bitcoin and gold are primarily diversifiers for both nickel and copper, with specific instances of safe haven and hedging capabilities identified using Wavelet Coherence.

Policy Recommendations

Hedging is a relatively new concept that is not frequently practiced in the Philippines due to capital market constraints and the lack of prevalent practices that encourage investors to protect their portfolio's downside. Compared to other developed countries, the Philippines does not have a public exchange that trades and regulates financial derivatives, which are principally used for hedging different types of risk. The

unconventional practice of hedging in the Philippines exposes retail investors and exporters to significant downside risks that are considered unnecessary and irrational in other countries. Therefore, the researchers recommend the following policy implications:

1. Consider the possibility of using other financial assets to hedge the volatility of nickel and copper.

Gold and Bitcoin are effectively considered diversifiers for nickel and copper, creating the need to investigate alternative financial instruments to hedge the price volatility of nickel and copper. Alternative financial instruments from different financial markets or tailor-made international derivatives are some of prospects for hedging instruments.

2. Utilize gold over Bitcoin as a diversifier for nickel and copper.

Investors and exporters can utilize gold over Bitcoin to diversify their risk for nickel and copper. The conventional rare earth mineral still outperforms Bitcoin in terms of reducing overall portfolio variance and tail-end risks. Notwithstanding, Bitcoin still offers diversification if included in a portfolio with nickel and copper.

3. Build more efficient portfolios that contain several financial assets.

Investors and exporters intending to own nickel and copper should strive to have an efficient portfolio consisting of several financial assets. The composition of several financial assets can include diversifiers and hedging instruments to address a variety of risks. Risk-free financial assets (e.g., government bonds) may also be included to provide a steady and definite source of income.

4. Encourage Filipino exporters to hedge their exports.

Government institutions should advocate accessible platforms for Filipino exporters to readily utilize several hedging instruments with respect to their exports. The first step to increasing hedging activity among Filipino exporters is to help them understand the fundamentals behind hedging, with subsequent support from the government to cooperate with private institutions in providing the optimal hedging instrument.

Introduction

Gold is traditionally seen as a great hedge and safe haven against economic uncertainty because it stores value and provides liquidity (Chemkha et al., 2021), but according to CoinDCX (2023), there is increasing interest in cryptocurrency, specifically Bitcoin, as a potential safe haven because Bitcoin exhibits similar characteristics to gold that could lend it to becoming a new safe haven asset. Much like gold, Bitcoin is decentralized and free from political influence and regulation by specific countries, which also means that gold and Bitcoin are inflation independent. The cryptocurrency market is also geographically independent, such that disruptions have to be at a global scale to affect the market significantly (Baur, Hong, & Lee, 2018).

Nickel and copper are some of the Philippines' most significant exports. For the year 2022, the Philippines was the second-largest producer of nickel and the sixth-largest producer of copper in the Asia-Pacific region, indicating that these rare earth minerals play a significant role in the Philippine economy (Dela Cruz, 2023; Global Data, 2023). Philippine exporters' increased dependence on nickel and copper prompts the exploration of hedging instruments to offset price risk and limit profit fluctuations. However, there is limited literature on whether gold and Bitcoin can serve as a proper hedge or as a safe haven for commodities. Commodities are usually used as a hedge for relatively riskier and more volatile investments such as equities, but commodities also face market disruptions that expose commodity exporters and producers (i.e., mining companies) to increased volatility which could affect their profitability as revenue generation suffers from price shocks.

Model Specification and Results

The study generalized three different methodologies: 1) parametric methodologies; 2) risk-reduction measures; and 3) non-parametric methodologies. The daily logarithmic returns are calculated from the daily price indices of Bitcoin, gold, nickel, and copper that were obtained from S&P Global. The parametric methodologies utilize the multivariate GARCH family models to estimate the dynamic conditional correlation that is used to determine if gold or Bitcoin are diversifiers, hedges, or safe havens. DCC-GARCH, ADCC-GARCH, and ADCC-GJR-GARCH are the three specific multivariate GARCH models employed for this study, with adjustments to take into account possible asymmetric relationships in the univariate and multivariate perspectives. Furthermore, the daily logarithmic returns were partitioned into two different time periods for each asset pair (i.e., Gold-Nickel, Gold-Copper,

Bitcoin-Nickel, and Bitcoin-Copper): 1) 2014-2023 and 2) 2019-2023. The partitioning of the data resulted in running the GARCH estimation and safe haven regression for each asset pair, where the dynamic conditional correlation is regressed with the hedged asset's (i.e., nickel and copper) returns. According to Tables 1 and 2, the positive intercept of the safe haven regression indicated that gold and Bitcoin are diversifiers for nickel and copper. Therefore, parametric methodologies concluded that gold and Bitcoin are diversifiers on average and not hedges for nickel and copper.

Table 1.
Summarized Results of Safe haven Regression's Intercept for 2014 – 2023

| <i>Components</i> | <i>DCC-GARCH</i> | <i>ADCC-GARCH</i> | <i>ADCC-GJR-GARCH</i> |
|------------------------------|------------------|-------------------|-----------------------|
| Intercept for Gold-Nickel | 0.155554*** | 0.168890*** | 0.163969*** |
| Intercept for Gold-Copper | 0.175925*** | 0.186076*** | 0.186367*** |
| Intercept for Bitcoin-Nickel | 0.066859*** | 0.067515*** | 0.067104*** |
| Intercept Bitcoin-Copper | 0.096812*** | 0.105101*** | 0.105782*** |

Note: *, **, *** indicate the significance at 10%, 5%, and 1%, respectively.

Table 2.
Summarized Results of Safe haven Regression's Intercept for 2019 - 2023

| <i>Components</i> | <i>DCC-GARCH</i> | <i>ADCC-GARCH</i> | <i>ADCC-GJR-GARCH</i> |
|------------------------------|------------------|-------------------|-----------------------|
| Intercept for Gold-Nickel | 0.170413*** | 0.171214*** | 0.172693*** |
| Intercept for Gold-Copper | 0.195118*** | 0.202884*** | 0.205118*** |
| Intercept for Bitcoin-Nickel | 0.107015*** | 0.116192*** | 0.112337*** |
| Intercept Bitcoin-Copper | 0.151572*** | 0.151573*** | 0.152297*** |

Note: *, **, *** indicate the significance at 10%, 5%, and 1%, respectively.

Subsequently, the risk-reduction measures are initialized on the optimal weights calculated using a minimum variance portfolio to create two-asset portfolios for comparison. Portfolio variance reduction, Value at Risk, Conditional Value at Risk, and Downside Risk Reduction were calculated to quantify the effectiveness of the diversifiers. The findings demonstrated that gold is a better diversifier for nickel and copper in terms of reducing portfolio variance and tail-end risk. The two-asset portfolio combinations of Gold-Nickel and Bitcoin-Copper provided the most and least benefit in terms of reducing portfolio risk, respectively.

The preceding methodologies predominantly leverage the GARCH families to investigate the hedging capabilities of gold and Bitcoin. However, the results from these two models are constrained to detecting safe-haven properties for copper and nickel on an average basis. To further examine the relationship between the hedging instrument (i.e., gold and Bitcoin) and the hedged asset (i.e., copper and nickel). The non-parametric methodologies drift from the parametric assumption and examines heterogeneity. The final methodology is composed of Quantile-on-Quantile Regression (QQR) and Wavelet Coherence (WC).

The QQR regresses each quantile of returns of the hedged asset and the hedging instrument to ascertain the effect of different market states (i.e., bullish, bearish, and normal). The QQR essentially supported the GARCH findings that gold and Bitcoin are diversifiers for nickel and copper, regardless of the market state. The study observed that the tail-end relationship (i.e., extreme bullish and bearish market states) increases significantly in terms of magnitude as the quantiles approach the lower and upper quantiles from the median. On the other hand, the WC assesses the correlation between two assets over varying time periods and duration (i.e., short-term, medium-term, and long-term). Figures 2 and 4 of the WC simply resulted in gold and Bitcoin being diversifiers for nickel and copper, respectively, throughout time and several economic shocks. However, Figures 1 and 3 contradicted the prior results obtained from the QQR and GARCH families. Based on Figure 1, gold was a short-term to medium-term hedge for copper in 2015, with effects lasting around 16 to 64 days. Gold was also safe haven for copper in the 2016 BREXIT and 2020 COVID-19 Pandemic. Similarly, Bitcoin was a long-term hedge for Nickel at the end of 2017, indicating around 128-256 days of hedging capability.

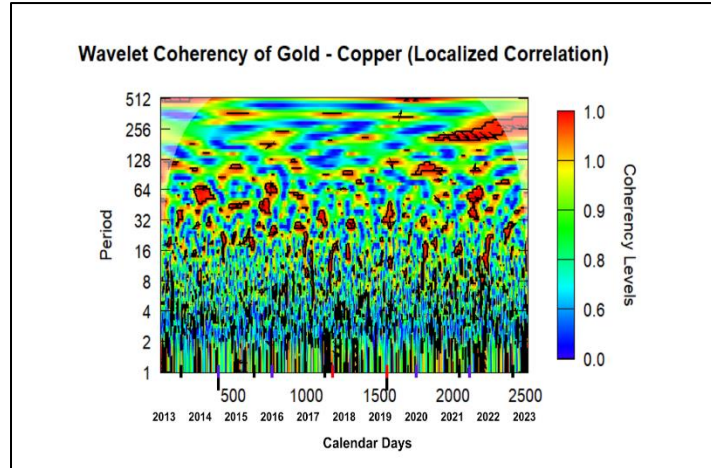


Figure 1. Wavelet Coherence of Gold – Copper

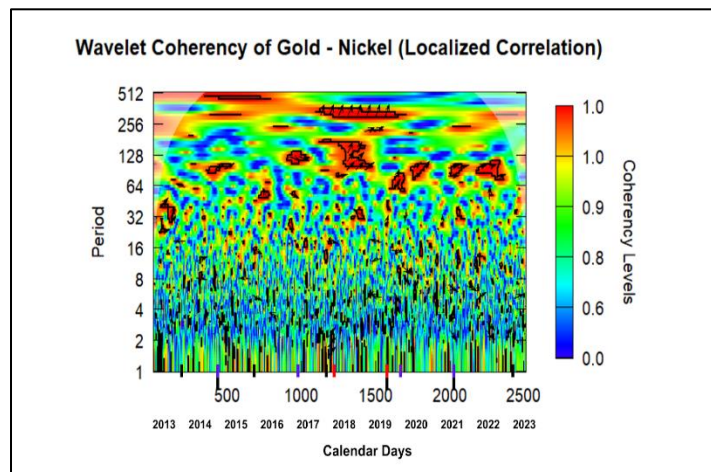


Figure 2. Wavelet Coherence of Gold – Nickel

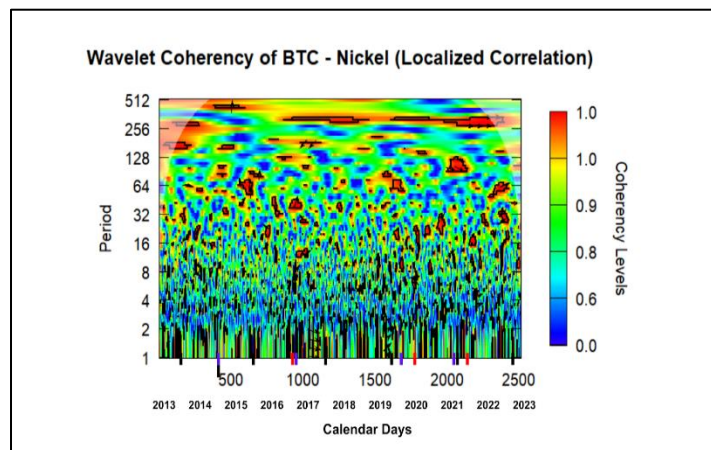


Figure 3. Wavelet Coherence of Bitcoin – Nickel

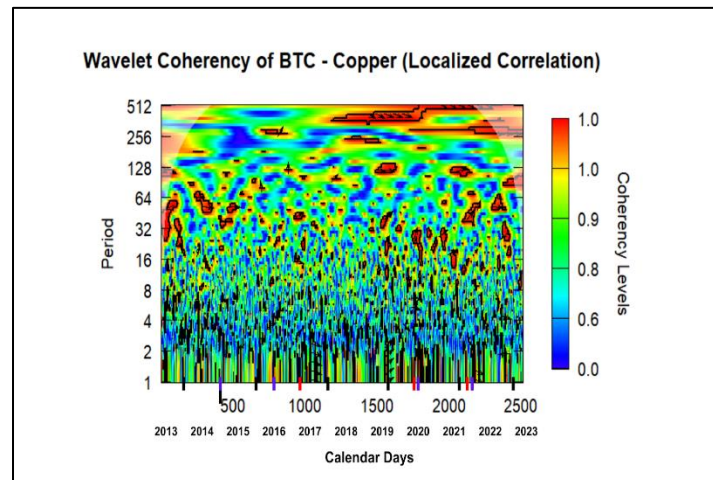


Figure 4. Wavelet Coherence of Bitcoin - Copper

Conclusion and Recommendations

The Wavelet Coherence contradicted the GARCH family and QQR results by illustrating several instances of gold operating as a safe haven and hedge for copper in 2015 and 2016, with Bitcoin as a long-term hedge for nickel in 2017. Despite the contradictory results, the study still concluded that Bitcoin and gold are diversifiers for nickel and copper, as the Wavelet Coherence identifies specific situations where hedging or safe haven characteristics are observed that are not recurring throughout time. The study recommends the integration of innovative methodologies (e.g., QQR, Wavelet Coherence, Multiresolution Decomposition Algorithm, Machine Learning) to investigate the hedging capabilities of different financial assets and examine if Bitcoin and gold actually behave as hedges and safe havens for the periods identified by the Wavelet Coherence by performing the parametric methodologies at those specific periods.

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