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Modelling the Time-Varying Gold Price Volatility in Malaysia (2005 – 2018)

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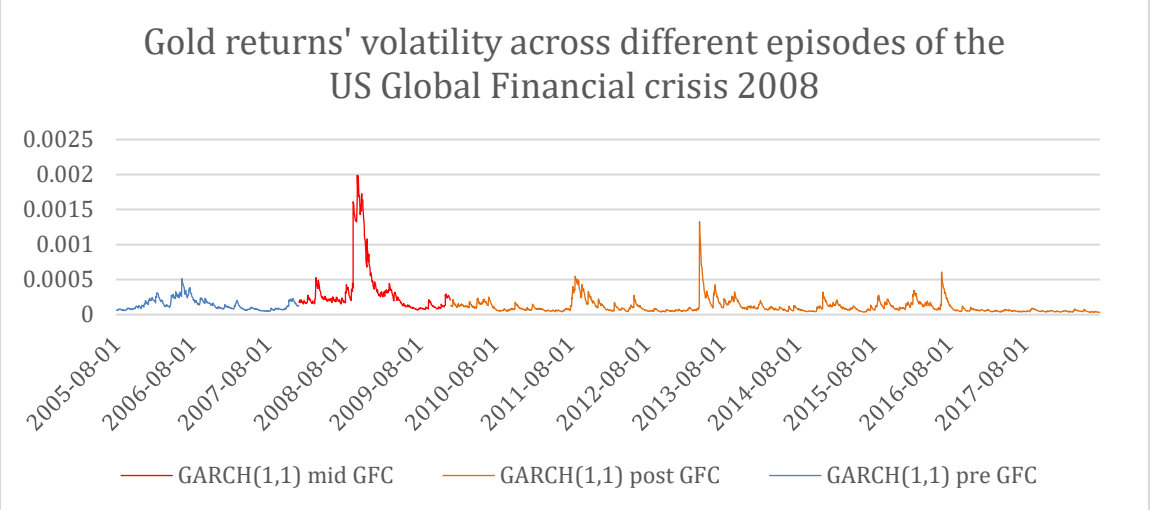
Research Highlights

This study provides new insights into the recent time-varying pattern of gold volatility surrounding the Subprime Global Financial Crisis (GFC) 2008 with special emphasis given to small open economy of Malaysia. Using daily data of gold bullion *Kijang Emas* issued by the Bank Negara Malaysia from August 2005 till July 2018, the study modelled the gold volatility using different models of ARCH-GARCH family. Under the context of emerging economy, the study found significant enhanced gold volatility during the middle of GFC, signifying that gold price is highly sensitive to specific economic disturbance. Next, our result displayed inverted asymmetry effect where investors interpret gold as a safe-haven investment during good gold returns, hence contributed to enhanced gold volatility. Finally, bilateral exchange rate (MYR/USD) affected volatility with positive sign, indicating that gold investment could be adversely affected during the depreciation of the Malaysian Ringgit.

Graphical Abstract

Figure 1: Gold returns' volatility across different episodes of the US Global Fin. Crisis 2008.



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Research Objectives

Theoretically, gold has an intrinsic value and is believed to have stable property from adverse economic shock. The significance of this study lies upon the incidence of gold volatility clustering (accumulated shocks) during the middle of financial crisis as widely discussed in recent literature especially for developed region. However, lack focus has been put to emerging economies including Malaysia especially after the US Subprime crisis 2008. Besides that, the issue gains its importance in risk management as there might be different sets of implications of asymmetry effect to gold volatlity. The mixed findings from previous studies on the natural hedge property of gold against paper money warrants us to further examine the effect of exchange rate (MYR/USD) to the volatility of gold (Christie-David *et al.* (2000). The findings are significant for asset portfolio allocation. Given all these issues, this study intends to address following objectives:

1. To model the pattern of gold price volatility using the ARCH-GARCH models.
2. To investigate the time variant nature of gold price volatility under different segments of the US Subprime crisis 2008.
3. To measure the effect of bilateral exchange rate (MYR/USD) changes on gold price volatility.

Methodology

The gold price and exchange rate data for this study were extracted from *Thompson Reuters Datastream* and Bank Negara Malaysia involving a period from August 2005 to July 2018. The period was choosen based on the sufficiency of data to capture volatility effects surrounding the GFC. The first objective of this study places emphasis on the pattern of gold volatility for overall period. The first objective was addressed using different ARCH-GARCH models specifically to capture the effects of volatility clustering (Bollerslev (1986)) and asymmetry effects of good or bad news on gold volatility. The second objective focuses on the time variant nature of gold volatility surrounding the Global Financial Crisis (GFC) 2008. In order to effectively capture the time varying volatility, our observations were analysed using sub-period analysis, where data were partitioned following to pre, mid and post time frames surrounding the GFC event. With respect to the third objective, this study embedded bilateral exchange rate (MYR/USD) into the GARCH model. To ensure robustness of our results, several diagnostic checks were conducted involving several indicators comprising log-

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likelihood, mean square error (MSE), Akaike's Information criterion (AIC) and Schwarz's Bayesian information criterion (SBC).

Results

Based on ARCH-GARCH modelling on *Kijang Emas* gold data from August 2005 to July 2018, several noteworthy results were found. First, GARCH(1,1) was found to be the best model in capturing long term memory process of gold volatility in comparison to higher order of ARCH(4) process and in line with Ping *et al.* (2013). Gold price volatility was persistent across all periods. In term of sub-period analysis, the hypothesis of higher gold price volatility during the crisis was proven where gold volatility was peaked during the middle of the Global Financial Crisis 2008. Besides, gold price volatility clustering was observed during significant external events such as European sovereign-debt crisis, quantitative easing by the US Federal Reserve and global uncertainty. In term of asymmetry effect, TGARH(1,1) and EGARCH(1,1) models exhibited inverted asymmetry effect where positive gold returns could enhance volatility mainly driven by the signals of safe haven gold investment (Baur (2012). Finally, we found a significant positive relationship between bilateral exchange rate (MYR/USD) and gold volatility. In term of portfolio management, this finding stresses the importance of having proper timing for gold investment, suggesting the suitability of gold investment during the appreciation of local currency against the US dollar.

Findings

Our finding concludes that the notion of stable gold price movement is no longer valid for short term investment as gold is highly sensitive to financial crisis and external economic turbulence (Ahmad & Ping, 2014). Our result also suggests that volatility clustering is evident during the middle of financial crisis. Next, good news releases have increased gold volatility, suggesting that investors interpret gold returns as safe-haven investment and increases investment activities. Finally, our result infers that proper timing for gold investment is very crucial in decision making where extra care should be taken especially under the local currency depreciation regime.

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