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The volatility dynamics of spot and futures gold prices: Evidence from Russia

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ABSTRACT

We examine the long memory property and structural break in the spot and futures gold volatility in Russia from 2008 through 2013. We find strong evidence of long memory in the volatility of both spot and futures gold series. The break dates are associated with the recent global financial crisis. Moreover, we investigate the volatility spillover effect between the Russian spot and futures gold markets using the corrected Dynamic Conditional Correlation model (cDCC). The findings show relatively high level of conditional correlation between spot and futures gold returns. This outcome decreases the portfolio diversification benefits for gold investors.

1. Introduction

Gold is the most popular metal among precious metals. Throughout history, gold has been valued as a medium of exchange and as a store of value. In spite of its limited industrial applications, gold has also gained recognition as a safe haven and hedge against inflation among investors (Christie-David et al., 2000; Worthington and Pahlavani, 2007; Tully and Lucey, 2007; Hess et al., 2008; Batten et al., 2010; Baur and Lucey, 2010; Baur and McDermott, 2010). Aside from these traits, the attraction of gold comes from its relationship with other asset classes including oil, stocks, and bonds. The low correlation of gold with other assets makes it a unique source of diversification to an investor's portfolio (Sherman, 1986; Hillier et al., 2006; Daskalaki and Skiadopoulos, 2011).

Over the past decade, there has been a remarkable explosion in global gold demand, thereby resulting in an overall increase in gold prices. The reasons of this surge are too numerous to list, but among the most important are a growing middle class in key jewelry-buying markets like India and China, and an overall increased use of hedging instruments. However, the recent global financial crisis in 2007–2009 was a turning point, during which the ever-increasing gold demand and prices have been particularly high even by historical standards. During this period, institutional investors became more aware of the role of gold in risk management and they have therefore accumulated gold in large quantities. Not only investors but also many countries took precautions to mitigate the consequences of economic downturns. Among these countries, emerging markets such as China and Russia received great attention due to their massive gold purchase and their significantly higher levels of accumulated gold reserves (PricewaterhouseCoopers, 2015; World Gold Council, 2015).

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Given the significance of gold to the world economy, analyzing the volatility of gold has also become a popular topic for consumers of gold, including central banks and the jewelry industry. As a consequence, a number of studies have examined the long memory and structural breaks to forecast volatility of gold in recent years (Cheung and Lai, 1993; Batten et al., 2010; Hammoudeh et al., 2011; Arouri et al., 2012; Demiralay and Ulusoy, 2014; Gil-Alana et al., 2015). Among the existing studies, Arouri et al. (2012) study long memory property and structural breaks in returns and volatility of four precious metals traded on COMEX. They use modified ICSS algorithm to detect the structural breaks in the metal series, and conclude that precious metals exhibit long memory property and the results do not change when the structural breaks are incorporated into models. Further, their results show that ARFIMA–FIGARCH class models provide more accurate volatility forecasts than other GARCH-type models. A recent study of Gil-Alana et al. (2015) examines long memory property of five major precious metal prices, including gold within a fractional integration framework while identifying structural breaks. Their findings similarly show evidence of long memory in all precious metals under investigation. They further detect two breaks in gold series in the years of 1980:4 and 2001:3, respectively.

More recent studies have investigated the relationship between gold and other asset classes in order to offset risks for portfolio diversification and hedging strategies (Hammoudeh and Yuan, 2008; Hammoudeh et al., 2010; Ewing and Malik, 2013; Hood and Malik, 2013; Lucey et al., 2014). Hammoudeh et al. (2010) examine the volatility and correlation interdependence among four precious metals using multivariate VARMA-GARCH and VARMA-DCC models. They document that all precious metals are both moderately sensitive to their own news and are weakly responsive to news spilled over from other metals in the short run. Ewing and Malik (2013) employ univariate and bivariate GARCH models to examine the volatility of gold and oil futures. They find that volatility shifts have been more frequent over the recent global financial crisis and there is a strong evidence of significant transmission of volatility between gold and oil markets. Lucey et al. (2014) use the integration index approach of VAR model and examine the volatility spillovers in London, New York, Tokyo and Shanghai gold markets. Their findings show that gold spillovers are concentrated as originating from London and New York.

There are, however, only a few studies on the volatility of gold in emerging markets (Soytas et al., 2009; Kirkulak-Uludag and Lkhamazhapov, 2014; Kumar, 2014; Arouri et al., 2015). Soytas et al. (2009) investigate the dynamics of spot gold and its co-movements with the world oil prices and observe negative impact of oil shocks on gold prices. Kirkulak-Uludag and Lkhamazhapov (2014) similarly examine the long-memory properties and structural breaks in spot and futures gold returns and volatility in Turkey. Their findings show true long memory in spot gold returns but no persistence in gold future returns. A presence of structural break is associated with the correction in gold prices during the post-global financial crisis. Kumar (2014) investigate the return and volatility transmission between gold and Indian industrial sectors by using generalized VAR-DCC-BVGARCH model. Their findings indicate a unidirectional significant return spillover from gold to stock sectors. In their recent study, Arouri et al. (2015) apply VAR-GARCH model to test the volatility spillover between gold prices and stock returns in China between 2004 and 2011. They further analyze the hedge ratios for gold-stock portfolio holding and argue that adding gold to a portfolio of Chinese stocks improves the risk-adjusted performance and can help to hedge effectively against a stock risk.

There seems to be a lack of research on the emerging markets, including the Russian gold market. Despite the increasing importance of Russia in the world gold markets, the Russian spot and futures gold markets have not been subject to any previous studies. This lacuna needs to be addressed, as the number of participants in spot gold market has grown significantly in recent years and futures gold contracts have become most-widely used instruments for risk management. Therefore, the studies on both spot and futures gold market can provide important information to investors in order to help them diversify their portfolios and build their hedging strategies.

This paper aims to examine the volatility dynamics of spot and futures gold prices in Russia. The current study proposes to contribute to the existing literature in several aspects. First, it is the first study to investigate the presence of long memory and structural breaks in Russian spot and futures gold market. The current paper tests long memory property in the spot and futures gold series by using GPH, Modified GPH and GSP estimators. Second, the paper detects structural breaks by using Bai and Perron (1998, 2003) approach. The presence of structural breaks is important to determine whether or not the long memory is true while incorporating the structural breaks into models. Third, the paper explores the volatility transmission between spot and futures gold markets by using corrected dynamic conditional correlation model (Aielli, 2009). Finally, it investigates the hedging performance of spot and futures gold series by estimating the hedge ratios.

The findings show that there is a strong evidence of long memory process in both spot and futures gold volatility. All long memory tests (GPH, mGPH and GSP) provide consistent results and the conclusions do not change when the structural breaks are incorporated into the models. Regarding the structural breaks, the results also reveal one break in the spot gold and one break in the gold futures in 2009. The break periods are associated with the recent global financial crisis, during which many investors flocked to gold as a safe haven investment. The in-sample forecasting analysis indicates that the FIGARCH model provides more accurate volatility forecast in most cases than other benchmark models including OLS and GARCH-class models. It is particularly true for long-term forecasting. The findings further suggest that the volatility transmission between spot and futures gold markets seems to be relatively high. The observed volatility spillover can be explained by the structure of the Russian gold market, where the government agencies work together with the licensed commercial banks. The high volatility spillovers between spot and futures gold markets suggests low portfolio diversification benefits for gold investors and may led them to consider alternative instruments to diversify away the increasing risk. Moreover, the results document relatively low hedge ratios, indicating that the investors may not be able to reduce their risks substantially by