








# Return spillovers between white precious metal ETFs: The role of oil, gold, and global equity ☆

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## Abstract

This paper investigates the relationship between white precious metals and gold, oil and global equity by means of spillovers and volatility transmission. Relying on the recently introduced ETFs, this study is the first to analyse return spillovers derived from an E-GARCH model and to take into account frequency dynamics to understand changes in connectedness across periods of time. Results uncover numerous channels of return transmission across the selected ETF markets over the last 10 years and highlight the role of gold ETFs as the most influential market in the sample. Furthermore, our work provides insights into the characteristics of white precious metal markets using a hidden semi-Markov model. Finally, we argue that even though silver and platinum have gained more importance as investment assets over the last few years, palladium still very much remains an industrial metal.

## Introduction

Silver, platinum and palladium have traditionally been viewed as precious metals used for production purposes rather than as investment vehicles. Recently however, white precious metals have received increased attention from investors due to the introduction of new Exchange Traded Funds (ETFs). Fig. 1, Fig. 2, Fig. 3, Fig. 4 show the increasing importance of investment demand for the four major precious metals over time.

Being relatively new asset classes (data for palladium and platinum ETFs is only available from the 1st of August 2010 onward), the problem of interconnectedness between white metal markets is still somehow unexplored in academic literature. This paper fills a gap by investigating the dynamic linkages between silver, platinum and palladium ETFs, as well as other significant asset classes, such as gold, oil and global equities.

More precisely, we test how gold, oil and global equity markets affect the behaviour of white metal markets. There are many reasons to believe that linkages between these target markets should exist. Gold and silver are somewhat close substitutes because of their use in jewellery production, their role as a monetary reserve and their active use in industrial production. Therefore, a high correlation and information transmission between these two markets can be expected. However, an empirical answer to the matter has still not been delivered by fellow researchers. Lucey and Tully, 2006, Sari et al., 2010 for example show that the long-run impact of gold returns on silver is quite important, where the latter example shows that gold explains 16% of the variation of silver returns, 10% of the variation of platinum returns and 7% of the variation of palladium returns. Furthermore, this relationship is also observed the other way around: white metal returns transmit information to each other and to gold. On the other hand, Balcilar, Hammoudeh, and Asaba (2015) find that by taking different regimes into account, the effect of the gold price on silver can be as high as 17 times greater than the effect of the silver price on gold.

The relationship between oil and gold is well-evidenced in literature. Baffes (2007) argues that a rise in the price of oil by 1\$ results in an increase of 0.34\$ in the price of gold and an increase of 0.50\$ in the price of silver. O'Connor, Lucey, Batten, and Baur (2015) summarise the relevant literature by arguing that oil drives inflation and inflation drives gold.

The importance of global equity price movements for the price of gold has been demonstrated by Baur and Lucey (2010) and Baur and McDermott (2010), both proving that gold has safe haven qualities during market turmoils. The hedging potential of white precious metals against equity prices has also been studied over the past few years. Hillier, Draper, and Faff (2006) consider the time period between 1976 and 2004 and find that silver has a hedging potential during high volatility periods, but that this ability is more pronounced for gold and platinum. Differentiating between bullish and bearish environments, Belousova and Dorfleitner (2012) argue that adding silver to a portfolio during bullish periods reduces volatility and enhances returns, while during bear markets, platinum is shown to lose its diversification properties.

Our study augments the existing literature in several ways. First, this paper examines the time-frequency dynamics of connectedness for gold, silver, platinum, palladium, oil and global equity ETFs using the new variance decomposition methodology proposed by Barunik and Krehlik (2015). Therefore, we discuss new stylized facts about cyclical properties of transmission mechanism in the precious metals markets and examine the time-frame of connectedness. Second, we provide valuable insights to white precious metal investors by running an E-GARCH model in order to quantify the impacts of daily returns of oil, gold and equity on the return of silver, platinum and palladium. Finally, we use the Hidden semi-Markov model (HSMM) to provide novel evidence on the return characteristics of white metal ETF markets.

The remainder of this paper is organised as follows: Section 2 discusses the relevant academic literature, 3 Data and preliminary data analysis, 4 Methodology shed light on data and the methodology while 5 Empirical results, 6 Discussion of results present and discuss the results. A conclusion of the paper is provided in Section 7.

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## Section snippets

### Literature review

White precious metals gained increased attraction as investment vehicles over the past few years. Recent findings point towards the impossibility to consider precious metals as a single asset class due to the distinct differences between them (Batten, Ciner, & Lucey, 2010) with gold having unique characteristics. It is not surprising that the relationship between gold and white precious metals has been the subject of research over the past few years. Early on, Chan and Mountain, 1988, Ma and...

## Data and preliminary data analysis

This paper employs daily ETF prices of gold, silver, platinum palladium, oil and global equity<sup>1</sup>, between the 19th of June 2006 and the 18th of June 2016. However, the earliest data available for platinum and palladium is ...

## Regime-switch cointegration test

The regime-switch cointegration technique of Gregory and Hansen (1996) are conducted to test for market integration as the sample may contain time-varying elements and structural breaks. Hatemi-J (2008) further develops a model that incorporates the impact of two structural breaks on both the intercept and the slope (i.e. two regime shifts). The model used in this study could be specified in the bivariate case as:

$y_{1t} = \mu_1 + \mu_2 D_{1t} + \mu_3 D_{2t} + \lambda_1^T y_{2t} + \lambda_2^T y_{2t} D_{1t} + \lambda_3^T y_{2t} D_{2t} + \varepsilon_t$  where  $D_{1t}$  and  $D_{2t}$  are dummy...

## Cointegration

Table 3 reports the relationship between the three white precious metals (i.e. silver, platinum and palladium) and other asset classes (i.e. gold, oil and global equity). The results show that all markets are well integrated while break dates can be identified around the years 2011, 2012, 2013, and 2014.

The results on the relationship between gold and silver prices are mixed in the literature. Ciner (2001) does not observe a long-run relationship between gold and silver prices and concludes...

## Discussion of results

Our findings indicate that gold plays an important role for silver ETFs, followed by platinum and palladium ETFs. Due to their low cost, low investment scale and their ability to track the gold price very closely (Ivanov, 2013), gold ETFs are a popular investment asset since their introduction in 2003. The strong relationship between gold and silver is supported by previous literature. Ma and Soenen (1988) find a strong relationship in both the spot and the futures markets and propose an...

## Conclusion

This paper provided new empirical evidence on return spillovers between white precious metal markets from 2006 to 2016. The results improve the understanding of the impact that gold, oil and global equity has on the dynamics of the connectedness of white precious metal ETFs. This study highlighted the shift of silver and platinum from an industrial towards an investment asset, making the results not only important from a theoretical perspective, but also highly significant for a broad range of...

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