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Causality and volatility patterns between gold prices and exchange rates

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ABSTRACT

This paper provides a new perspective on the link between gold prices and exchange rates. Based on gold prices denominated in five different currencies and the related bilateral exchange rates, we put causalities and short-run volatility transmission under closer scrutiny. We provide evidence that the identification of a strong hedge function of gold requires an explicit modeling of the volatility component. For all currencies, exchange rate depreciations initially have a negative impact on the gold price after one day which turns out to be positive after two days in most of the cases. Contrary to previous studies, our results point to a specific role of the dollar in the context of gold-exchange rate relationships: volatility of dollar exchange rates more frequently results in strong hedging functions of gold prices. Furthermore, the gold price denominated in the US dollar tends to increase after a depreciation of the dollar.

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1. Introduction

A long-established relationship between gold prices and dollar depreciations is based on the law of one price: if gold is denominated in US dollar, dollar depreciations coincide with increasing gold prices in order to eliminate arbitrage opportunities. This identity has been established by Beckers and Soenen (1984) and Sjaastad and Scacciallani (1996) among others. Studies by Capie, Mills, and Wood (2005) and Sjaastad (2008) confirm this finding for different dollar exchange rates with the latter study also identifying a causality from dollar movements to the price of gold denominated in different currencies.

In this vein, the present paper contributes to the literature in three different ways: firstly, we focus on volatility transmission between the gold prices denominated in different currencies and bilateral exchange rates as a novel issue. This is important since both gold and exchange rates are (1) traded at a high frequency and (2) linked to each other through hedge or safe haven features which are related to periods of volatility (Ciner, Gurdgiev, & Lucey, 2013). Secondly, we pay specific attention to the issue of causality, allowing for spillover effects in both directions. The literature is notably silent when it comes to a clarification of the causality issue between gold prices and exchange rates. Considering that exchange rates and gold prices are asset prices, it is reasonable to assume that causalities can go into both directions.[3] Finally, we investigate whether a special pattern for the US dollar can be identified if several gold prices and exchange rates are considered. Pukthuanthong and Roll (2011) have recently shown that the price of gold can be associated with currency depreciation not only for the US dollar but also for other currencies. While they focus on a correlation analysis and Granger causality tests, we investigate whether volatility spillover effects offer a specific role for the United States. To analyze these questions, we estimate a GARCH-in-mean SVAR model in the tradition of Elder (2003) which allows us to estimate the parameters of interest in an internally consistent fashion.

The remainder of this paper is organized as follows: We briefly turn to a review of the most relevant literature in Section 2 before proceeding with a description of our data in Section 3 and of our methodology in Section 4. Section 5 presents our results and Section 6 concludes.

2. Review of the literature

Taking into account the large body of literature on gold prices and exchange rates, we only elaborate on a few selected studies in the following review. Early studies by Capie et al. (2005) and Sjaastad (2008) have examined the hedge property of gold with respect to changes of the US dollar and have shown that dollar exchange rates and gold prices are inversely related with the latter study also identifying a causality from dollar movements to the price of gold denominated in different currencies. More recently, Joy (2011) focused on a sample period covering 1986–2008 for 16 currencies (G7 and emerging markets) on a weekly basis. Applying DCC-GARCH models he confirms the finding that gold acts as a hedge against the dollar. Relying on weekly data from 2000 to 2012, Reboredo (2013) also finds that gold acts as a hedge and a safe haven against the dollar while examining seven major currencies against the dollar (Australian dollar, Canadian dollar, euro, British pound sterling, Japanese yen, Norwegian krona, and Swiss franc) based on standard copula techniques. These insights have been deepened in two follow-up studies in which Reboredo and Rivera-Castro (2014a, 2014b) also examine the safe haven properties of gold for the same seven currencies and the same sample period relying on a likelihood ratio test and a wavelet correlation analysis, respectively. Apergis (2014) also shows that gold is an useful predictor for the Australian dollar. Based on simple cointegration and Granger causality tests Jain and Ghosh (2013) confirm a relationship between gold prices and the Indian rupee-US dollar exchange rate using daily data spanning from January 2009 to December 2011.[4] Studying the relationship between commodities and currencies from a more general perspective, Antonakakis and

[3] Turning to a related topic in terms of causality, evidence for different causalities between dollar exchange rates and oil prices have been provided. This is true for both in-sample causalities as well as out-of sample predictability (Beckmann & Czudaj, 2013; Chen, Rogoff, & Rossi, 2008).

[4] See also O'Connor, Lucey, Batten, and Baur (2015) for an excellent overview of the whole strand of literature.