



Does the value of US dollar matter with the price of oil and gold? A dynamic analysis from time–frequency space



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ABSTRACT

This paper uses wavelet analysis to examine whether the value of US dollars drives the price of oil and gold. By decomposing the pairwise relationship between oil–US dollar and gold–US dollar into short-term and long-term components, risk managers who are pursuing different decision-making horizons would be able to moderate their risk exposures according to these results. Empirical findings indicate that the pairwise relations became weaker as the time frames being observed widened, suggesting that short-term correlations were much higher after early 1990s. The Fed monetary policy is the main driver to the pairwise correlations of oil–US dollar and gold–US dollar. The dynamic interdependences also indicate that crude oil market has been dominated by the US dollar while gold leads the US dollar in the short run after early 1990s. On the other hand, we find that financial crises do accelerate interdependences between oil–US dollar and gold–US dollar, which alter the original relationship between these assets. The risk variables of TED spread and variance of S&P 500 predict the closer oil–US dollar and gold–US dollar correlations during the crisis period.

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1. Introduction

The prices of international commodities have soared during the first decade of 2000. For example, historically, from 1946 until 2014, crude oil averaged 38.2 USD/BBL reaching an all-time high of 145.3 USD/BBL in July of 2008. Gold price announced by the World Gold Council rallied a record high at \$1895 per ounce in September 2011, while it was only \$265 per ounce in January 2001. Based on fundamental economic theory, the price of a commodity is determined by the confluence of demand and supply. However, the underlying demand and supply for crude oil have barely changed during the first decade of 2000, neither has the gold market experienced large fluctuations in demand and supply. Price soaring of both commodities seems far beyond what fundamental theories of demand and supply could predict.

Literature on the main drivers of oil prices has noted that except for the fundamental factors of demand and supply, increasing attention has been paid to the financial attributes of petroleum, such as the paper market of crude oil and US dollar denomination. As noted in *2011 World Oil Outlook* from the OPEC, the open interest for crude oil futures traded in the NYMEX exceeded the unprecedented level of 1.5 million contracts, which is 18 times higher than the amount of daily traded physical crude oil. Speculating activity on the NYMEX surged to record highs in the first quarter of 2011, which drove spot price of oil up. Besides speculation, the ongoing quantitative easing policy adopted by the US Fed since 2002 has kept US dollar weak, which contributes to another main driving force in the rise of oil prices (see e.g., Zhang et al., 2008; Bhar & Malliaris, 2011).

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Just as crude oil is more than a mere physical commodity refined into petroleum products for automobiles, gold is not simply an object of beauty. Gold, being regarded as a strategic asset, plays its roles as a portfolio diversifier (Chua et al., 1990; Jaffe, 1989; Johnson & Soenen, 1997), an inflation hedge (Sjaastad, 2008), an exchange rate hedge (Cappie et al., 2005; Reboredo, 2013), and a safe haven against future “event” risks (e.g. Baur & Lucey, 2010; Baur & McDermott, 2010; Reboredo, 2013). Due to the financial attributes of oil and gold, the determinants of their prices are more than what the demand and supply could explain. As illustrated in Panel B and C of Fig. 1, prices of oil and gold have experienced dramatic volatilities over the 1st decade of 2000. Almost at the same time, the Fed started to adopt the quantitative easing policy, leading US dollar to be depreciated. This paper is motivated to provide recent insights on the relationship between oil–US dollar and gold–US dollar, especially during the period of early 2000s.

Since oil and gold are major commodities in the global economy, the determinants of their price movements are crucial to the policy makers who need to control the expected oil inflationary pressures as well as to the risk managers who search to diversify

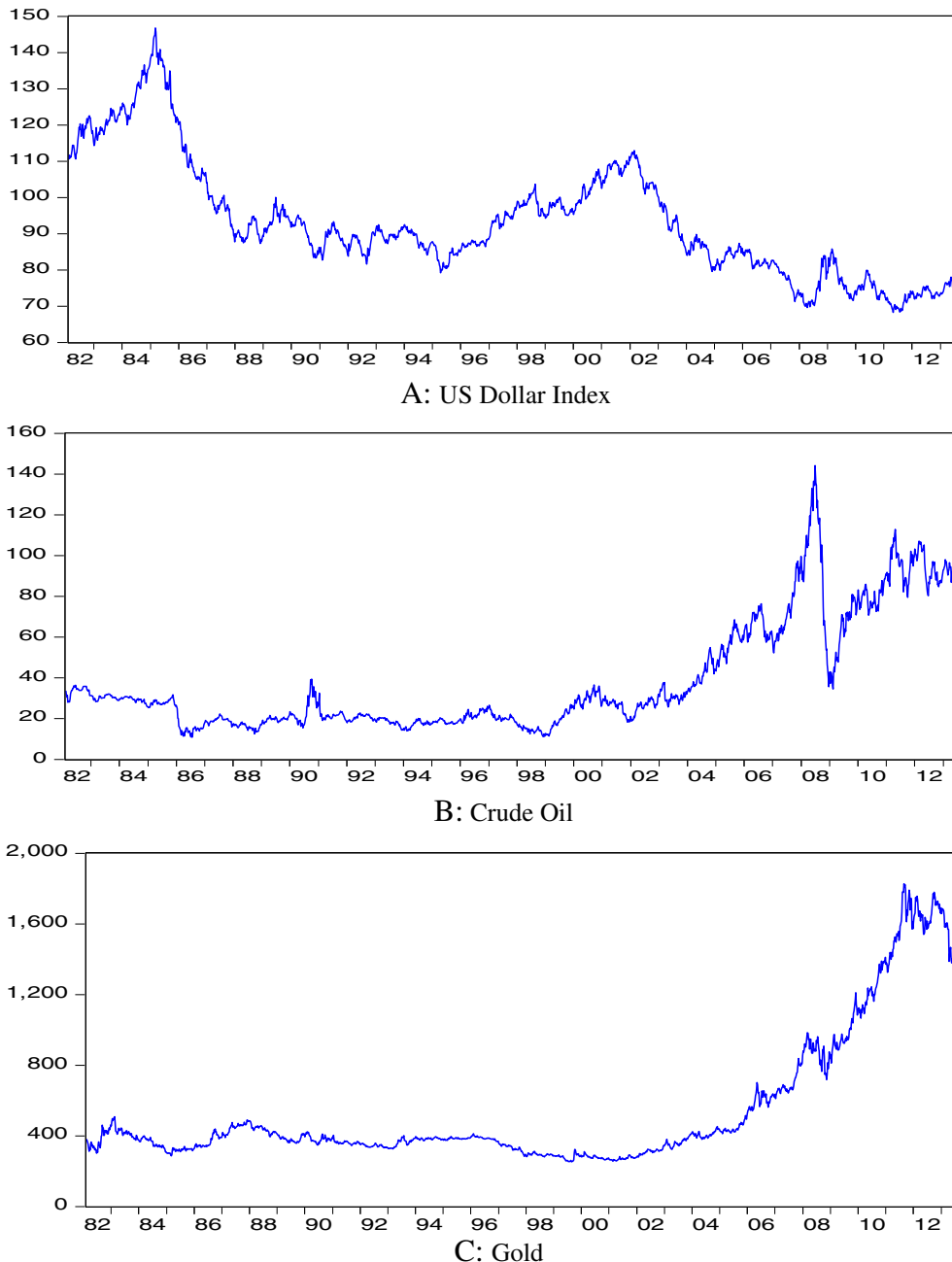


Fig. 1. Trend Graph. This figure depicts the trends of US dollar index, crude oil, and gold prices. Weekly data from February 10, 1982, to July 31, 2013, with a total of 1643 observations of, are used. All the data are obtained from *Datastream*.

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