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Financial crises and the nature of correlation between commodity and stock markets

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ABSTRACT

This paper models time-varying correlations between commodity and stock markets to uncover the dynamic nature of correlations during the financialization of commodity markets and in the aftermath of the recent financial crisis. Particularly, we search for upward trends in correlations and investigate the impacts of global and market volatility, and the news from the markets on the time-varying structure of correlations. The focus is on two commodity sub-indices; agricultural commodity and precious metal. New evidence against the rising trend is found for the agricultural commodity sub-index and empirical results show that high market volatility during financial crises seems to be the main source of high correlations. Moreover, increase in correlation is not a new phenomenon and cannot be attributed to the recent financial crisis. For the precious metal sub-index, market volatility plays crucial role in the dynamic nature of correlation along with rising trend. Furthermore, heterogeneous structure of commodity markets delivers better portfolio diversification opportunities during calm periods compared to turmoil periods. It is empirically shown that the gain of portfolio diversification across commodity and stock markets is not negligible.

1. Introduction

In order to reduce risk burden generated by the uncertainty on future values of their investments, financial investors use various portfolio diversification strategies. These strategies require low correlations among assets to attain lower risk levels. The findings of earlier literature, which employ data series up to 2004, indicate that the return correlations among commodity and stock markets are very low.¹ With their low correlations and competitive return rates,² commodity markets offer valuable diversification opportunities³ to financial investors. Therefore, the interest of financial investors in commodity markets has been growing since 2000 and generally they engage in commodity markets through direct or indirect investment in commodity futures. At the end of 2010, the number of financial investors, who are recognized as non-commercial participants by Commodity Futures Trading Commission (CFTC), was three times higher than the number of traditional investors engaging in commodity futures to hedge against commodity price fluctuations (CFTC, 2011). As an alternative to financial markets, investable commodity indices such as Standard & Poor's Goldman Sachs Commodity Index (S & P GSCI) or the Dow Jones American International Group Commodity Index (DJ AIG) or sub-index of

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E-mail addresses: mfozte@ybu.edu.tr (M.F. Öztek), ocal@metu.edu.tr (N. Öcal).¹ See Greer (2000), Erb and Harvey (2006), and Gorton and Rouwenhorst (2006) among others.² See Greer (2000), Gorton and Rouwenhorst (2006).³ Moderate investment in commodities provides significant reduction in the risk level of a typical portfolio which consists of only stocks. See Becker and Finnerty (1994), Georgiev (2001), Hillier, Draper, and Faff (2006) among others.<http://dx.doi.org/10.1016/j.iref.2016.11.008>

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these two indices have emerged as an important class of investment instruments for financial investors. It is estimated that total investment in various commodity indices increased from \$15 billion in 2003 to \$200 billion in 2008 (CFTC Staff Report, 2008) and to \$376 billion at the end of 2010 (Barclays Capital, 2011).

Second half of the 2000s also witnessed boom and bust cycles in commodity prices and price volatility of various commodities reached to the very high levels. With the increasing role of financial investors in commodity markets, which gives rise to the term of “financialization⁴ of commodity markets”, the possible effects of investment inflows on commodity prices have become popular research interest. Financialization of commodity markets can affect two major functions of commodity futures; risk sharing and information discovery (Cheng & Xiong, 2014). Futures markets provide centralized platforms for sharing price risk between producers and consumers. Traditionally, commercial traders in commodity futures markets have had to offer risk premium due to lack of enough participant providing funds on the long side. By taking long position in commodity futures markets, financial investors improve the risk sharing capability of futures markets. This is the direct and anticipated impact of financialization of commodity markets and this injection of huge liquidity from financial markets is blamed for price increases. On the other hand, financial investors consume liquidity from commercial participants when they close out their long positions due to the variations in the risk level of their investments in financial markets. Thus, as a result of financialization of commodity markets and portfolio strategies of financial investors, commodity markets have become vulnerable to the outside shocks from financial markets. To wit, through these two opposite channels financialization can affect risk sharing in commodity markets. The other crucial impact of financialization is that the actions of financial investors create informational frictions in commodity markets. It is very difficult to differentiate whether futures’ price movements arise from trading of financial investors or developments in economic fundamentals of commodity markets. Thus, financialization can mislead the price discovery function of commodity futures.

Based on these economic reasoning and mechanisms, the literature in this field concentrates on two main research questions. The first one is whether the positions of financial investors, who treat commodity markets as an alternative to financial markets, distort pricing mechanism of commodities and therefore create huge price bubbles and large fluctuations. However, empirical literature found very little causality between financial investors’ positions and change in price for wide basket of commodities (Irwin, Sanders, & Merrin, 2009; Brunetti & Büyüksahin, 2009; Stoll & Whaley, 2010; Büyüksahin & Harris, 2011; Sanders & Irwin, 2011a, 2011b). Besides, the studies investigating inventory implication of storage theory (i.e. higher futures’ price induce rise in inventory) found that the price booms during the second half of the 2000s were not accompanied by an inventory spike (Kilian & Murphy, 2013; Knittel & Pindyck, 2013). Consequently, these studies can be seen as evidence against the strong causality between commodity prices and trading of financial investors.

Similar to the discussion of the integration of emerging economies’ financial markets, if the trading of financial investors in commodity markets can cause price changes along with the commodity market fundamentals then new dynamics are expected to govern the interdependence between commodity and stock markets. Thus, the second focused question is how the dynamic nature of correlation between commodity and stock markets, which has vital implications for portfolio diversification strategies, has evolved during the period of financialization of commodity markets. The second channel through which the trading of financial investors transmits external shocks from financial markets to commodity markets suggests higher correlations between financial and commodity markets during financial turmoil periods. The empirical literature witnessed various attempts to find evidence of increasing trend in return correlations between commodities and stocks, as well as among commodities. However, rising trend has not been revealed until 2010. Büyüksahin, Haigh, and Robe (2010) used dynamic correlation and recursive co-integration models but could not find evidence of increasing trend in the correlations between investable commodity indices (S & P GSCI and DJ AIG, and their sub-indices) and stock market index (S & P500) for the period from January 1991 to May 2008. They also reported that there was no evidence of increasing correlations even during periods of extreme returns. On the other hand, recent empirical studies, Büyüksahin and Robe (2011), Tang and Xiong (2012) and Silvennoinen and Thorp (2013), managed to find evidence of increasing trend in correlations among commodity and stock market indices. By modeling correlation between weekly returns during the period from January 1991 to May 2011 under the DCC-GARCH framework, Büyüksahin and Robe (2011) indicated that the correlation between S & P GSCI energy sub-index and S & P500 index was time varying without a particular trend until September 2008. But since then, which coincided with the onset of the financial crisis in the US, the correlation exhibited an upward trend and reached to very high levels unseen in the prior two decades.⁵ Similarly, Tang and Xiong (2012) documented that return correlation between S & P GSCI and S & P500 indices significantly increased in September 2008. Unlike these evidences of recent upward trend, Silvennoinen and Thorp (2013) showed that return correlations of commodities started to increase around the early 2000s, well before the recent financial crisis, and reached to peaks during the recent crisis.⁶ They modeled time varying correlations among commodities and stock markets indices in the US, UK, Germany and France with smooth transition specifications for the period from May 1990 to July 2009.

Although these studies agree on their findings, return correlations between commodity and stock markets have upward trend, their mix findings on the timing of trends lead different conclusions and it is not clear whether the rising trend is a result of financialization process and/or financial crisis. If the return correlations start to increase in early 2000s (as reported by Silvennoinen & Thorp, 2013) then the financialization process (capital inflows by financial investors) itself may lead integration

⁴ In the context of this paper, the term of “financialization” refers to increase in activities of non-commercial participants (financial investors). For more specific uses of this term, see Tang and Xiong (2012) and Büyüksahin and Robe (2014).

⁵ Zhu, Li, and Li (2014) investigated the dependence between crude oil and stock market returns of Asia-Pacific countries. They reported that the dependence was weak before the crisis but it increased significantly in the aftermath of the crisis. Besides, they showed that lower tail dependence was much higher than the upper tail dependence after the crisis.

⁶ Barunik, Kočenda, and Vácha (2016) also reported that the pattern of correlations has radically changed since 2001.

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