



A leader of the world commodity futures markets in the making? The case of China's commodity futures

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ABSTRACT

We use the daily data of 16 commodity futures contracts traded in China and corresponding foreign markets (the US, the UK, Japan, and Malaysia) to analyze the linkages between markets. Several findings are noteworthy. First, trading returns of foreign markets, such as the US, have significant impact on China's overnight (close-to-open) returns and vice-versa. Second, daytime (open-to-close) returns of many Chinese commodity futures contracts are *not* led by foreign daytime returns. Finally, the close-to-close returns analysis suggests that there are no significant lead-lag relationships between the Chinese and foreign markets. These results suggest that (1) the Chinese commodity futures markets are information-efficient, and (2) they are likely to be driven by local market dynamics occurring during the daytime trading session.

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1. Introduction

China is now the second largest economy in the world after three decades of economic reforms toward a market-oriented economy since late 1978. Jeremy Grantham of Grantham Mayo Van Otterloo (GMO) estimates China's current share of global consumption is 53.2% in cement, 47.7% in iron ore, 46.9% in coal, 45.4% in crude steel, 41.3% in zinc, 40.6% in aluminum, 38.9% in copper, 28.1% in rice, 24.6% in soybeans, 16.6% in wheat and 10.3% in oil.¹ These figures simply demonstrate the important role of China in the world's economy. Chinese futures markets have grown rapidly with many contracts now available for trading.

Since trading began at several commodity futures exchanges in China, the Chinese government has strived to develop its futures markets to satisfy the growing domestic needs for hedging purposes and for price discovery.² Strategically, the Chinese government has decided to let its futures markets play an important role in the global markets but avoiding undue influence from global speculative forces. The

Chinese futures exchanges are now ranked among leading derivatives markets by the number of futures contracts traded.³ Thus, it is important to examine the linkages of Chinese futures markets with other major global futures markets and the role they play in the world markets.

Currently, there are four futures exchanges in China, namely, the Dalian Commodity Exchange, Zhengzhou Commodity Exchange, Shanghai Futures Exchange, and China Financial Futures Exchange trading a total of 26 futures contracts. Because of the voracious demand for commodities and metals from China, these Chinese markets undoubtedly react to global information in setting prices. With the approval of the Qualified Foreign Institutional Investors (QFII) scheme allowing foreign investors to trade the CSI 300 futures contract on the China Financial Futures Exchange, foreign participation in futures trading in China will further enhance the opening up of China's futures markets to the world.⁴ This change in policy stance suggests that Chinese policymakers believe that their futures markets

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¹ Quoted in Aronson, Abel. "Paradigm Shift," *Barron's*, May 14, 2011.

² See Yau (2007) for an account of the historical developments of the Chinese commodity trading and futures exchanges.

³ The Zhengzhou Commodity Exchange is ranked 11th, the Shanghai Futures Exchange 14th and the Dalian Commodity Exchange 15th in the world by number of futures contracts traded for the period January–June of 2011, according to the Futures Industry Association in the U.S. ([http://www.futuresindustry.org/downloads/Complete_Volume\(11-11_FI\).pdf](http://www.futuresindustry.org/downloads/Complete_Volume(11-11_FI).pdf)).

⁴ The underlying asset of the CSI 300 index futures contract is the CSI 300 index, which is the first equity index jointly launched by the Shanghai Stock Exchange and the Shenzhen Stock Exchange to represent the price fluctuation and performance of China's A-share market.

have been functioning in an orderly and proper manner without as much disruption as before. The Chinese government has deliberately tried to position the energy, metal, and agricultural futures markets to become major players in setting the world prices for these commodities. The rationale is that if Chinese companies and investors play a crucial role in price setting for futures contracts at home, China, which is an agricultural and manufacturing economy, will be less vulnerable to foreign speculative forces.

Despite its buying power and significant influence in the world prices of metals and agricultural commodities, the Chinese futures markets may not be fully integrated into world markets due to various market impediments such as currency and capital flow control. Thus, there remains a question as to the role of the Chinese futures market in setting or leading commodity prices globally. This issue needs to be examined thoroughly since it may have significant policy implications for futures trading in China. Previous studies (e.g., Fung, Leung, & Xu, 2003; Ghosh, Saidi, & Johnson, 1999; Hill, Schneeweis, & Yau, 1990; Huang, Yang, & Hu, 2000; Kwan, Sim, & Cotsomitis, 1995; Lee, Fung, & Liao, 2009; Savanayana, Schneeweis, & Yau, 1992; Syriopoulos, 2007; Xu & Fung, 2005) provide a rich resource to investigate linkage across financial markets. These previous studies document a distinct pattern of information flow across global financial markets; information tends to flow from larger, more liquid, and more efficient markets to those that are smaller, less liquid, and less efficient. Additionally, these studies show that the US financial markets play a central and predominant role in information flow across world markets. For example, Xu and Fung (2005) found that the US market plays a more important role than the Japanese market in the cross-market price transmission of gold, platinum, and silver futures. In particular, Lee et al. (2009) have shown a close linkage of Chinese futures markets with those of the US but with day-of-the-week effects that are unique to the home market. Besides information flow across markets, price discovery of the same assets trading on multiple markets is also widely investigated. Prior studies (e.g., Covrig, Ding, & Low, 2004; Ding, Harris, Lau, & McInish, 1999) document significant contribution by foreign markets in the price discovery process despite the dominant role of the home market.

The purpose of this study is to examine the role of Chinese futures markets in the global context and their price linkages across global markets. We probe to see to which extent China is now ready to play a leading role in setting the world commodity prices. Specifically, we investigate whether Chinese futures markets are information-efficient and how they react to global market forces.

Our results contribute to the extant literature in several ways. First, by using an extensive set of 16 commodity futures contracts, which match corresponding futures contracts in different countries, including the US, the UK, Japan, and Malaysia, and the longest possible period available as early as December 2003,⁵ we are able to readily generalize the results on the Chinese price movements across global futures markets over different economic cycles. Past studies, however, consider less commodities and futures markets. For example, Fung et al. (2003) examined the US–China price linkages in copper, soybeans, and wheat futures contracts for the period 1995–2000, and found that these two markets were segmented. Fung, Liu, and Tse (2010) examined the information flow and market efficiency in aluminum and copper futures markets between the US and China for the period 1999–2009. They showed that the US and Shanghai futures prices were closely related and both markets were comparably efficient on a daily basis. These studies suggest that the Chinese markets have evolved considerably over time. Thus, it is appropriate to conduct a more comprehensive study with a long trading period in order to learn more about how the performance of Chinese futures markets compares to other global markets.

Second, the recent data used in this study should enable us to capture futures price volatility resulting from the global financial crisis as well as to shed light on how the Chinese futures market reacts to turbulent global forces. As global commodity markets experienced extraordinary price hikes and volatility between 2006 and the first half of 2008, energy, metals, and agricultural commodities had reached unprecedented price levels, raising concerns about the efficiency of commodity markets. Since the recent commodity market volatility is largely attributable to trading arising from the huge demand from emerging economies and speculative activities that rely on speculators' ability to obtain relevant information quickly,⁶ the Chinese futures markets are expected to play an increasingly important role in providing cross-border information flow.

Finally, by analyzing Chinese futures contracts in cross-market information transmission through trading and non-trading information effects, we fill the void in the extant literature that is primarily based on the close-to-close returns analysis. The close-to-close returns analysis ignores the findings from previous studies on foreign futures markets (e.g., Hill et al., 1990; Savanayana, Schneeweis, & Yau, 1992) that information embedded in non-trading returns (close-to-open returns) and in trading returns (open-to-close returns) are significantly different, and that they react differently to information from the foreign market vis-à-vis the domestic market. Thus, in this study, we examine the price linkages of Chinese futures markets with the global markets using close-to-open, close-to-close and open-to-close returns analysis.

We use variance ratio analysis on trading and non-trading returns to investigate how trading returns are affected by foreign markets. Fung and Patterson (2001) note that greater integration among financial markets was observed when the US market had increased its use of information during non-trading periods, which was reflected in changes in return volatility. This finding implies that a market can shift its reliance on information between the domestic and offshore sources, depending on the relative flow of information emanating from these sources. Other studies, such as Fleming, Kirby, and Ostdiek (2006), and Tse (1999), use the variance ratio of trading and non-trading periods to analyze information flow across markets.

We test the hypothesis that information on commodity futures prices originated from China gets transmitted to other foreign markets such as the US. The variance ratios (VR) of Chinese futures contracts should be greater than one and higher than those of foreign markets if the Chinese futures markets react to local information more than that emanating from foreign markets.

We analyze the contemporaneous effect of trading returns of a foreign market (i.e., the US or the UK) on overnight (close-to-open) returns of the Chinese futures market and vice-versa. We also use causality tests to analyze how daytime (open-to-close) returns are affected by foreign daytime returns. To complete the analysis, we also use close-to-close returns. Results from these tests suggest that there are no significant lead-lag relationships between Chinese futures markets and corresponding foreign ones. However, because Chinese futures markets have already incorporated global information into opening prices, daytime returns are largely affected by China's own trading activities. These results suggest that (1) the Chinese futures markets are information-efficient, and (2) they are likely to be driven by local market dynamics during the daytime trading session.

The rest of the paper is organized as follows. Section 2 presents the data. Section 3 provides and discusses empirical results. The final section presents a summary and concludes.

2. Data

Daily data of Chinese futures markets and corresponding foreign markets are obtained from Commodity Systems, Inc. (CSI). We

⁵ The ending date for this study is October 2011.

⁶ See Henriques (2008) and Ruggiero (2008).

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