Dependence of stock and commodity futures markets in China: Implications for portfolio investment

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ABSTRACT

We examine the recent trends in dependence structure between the fast-growing commodity markets and the stock markets in China. We address this issue by using copula functions that allow for measuring both average and tail dependence. Our results provide evidence of low and positive correlations between these markets, suggesting that commodity futures are a desirable asset class for portfolio diversification. By comparing the market risks of alternative portfolio strategies, we show that Chinese investors can take advantage of commodity futures during different times to realize risk diversification and downside risk reduction benefits.

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1. Introduction

In the last decade, China's commodity futures markets have experienced brisk growth. The number of varieties listed has increased dramatically, the trading volume and the turnover for the period 2001–2010

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grew by 142.5% and 161.4%, respectively, and trading was about 15 billion yuans at the end of 2010 and 220 billion yuans in April 2013. The Chinese commodity futures market is, thus, among the largest commodity futures markets in the world, which qualifies it to have an increasing influence on the pricing of other assets and the investor portfolio decisions, given the financialization of commodity markets (e.g., Cheung and Miu, 2010).

This study endeavors to analyze how the fast pace of growth in China's commodity markets has been affected by the trends in its financial market. To this end, we examine the market co-movement between the commodity futures markets and stock markets in China. The information about the interdependence of commodity and stock markets is particularly relevant for investors because diversified portfolios may be composed of both commodities and stocks (see, e.g., Daskalaki and Skiadopoulos, 2011; Silvennoinen and Thorpy, 2013; Sarafrazi et al., 2014) and also because hedging and risk management opportunities arising from commodity markets depend on the degree of integration of both markets (see, e.g., Creti et al., 2013). Diversified investments are warranted in China since the national saving rate is about 40% of GDP and most of this rate goes to saving accounts due to a lack of adequate investment opportunities.

In theory, dependence between returns of commodities and stocks is expected to be low since the factors driving commodity prices (e.g., world demand, productivity growth rates, weather conditions, geopolitics and physical discoveries and supply constraints) are distinct from those determining the value of stocks (Daskalaki and Skiadopoulos, 2011). Furthermore, unlike stocks, commodities can serve as an inflation hedge or safe havens. For this reason, investors are interested in adding commodity futures to their portfolios with the aim of diversifying and reducing the downside risk. Although many previous empirical studies report low commodity-stock market correlations (see, e.g., Belousova and Dorfleitner, 2012; Bodie and Rosansky, 1980; Büyüksahin et al., 2010; Chong and Miffre, 2010; Geman and Kharoubi, 2008; Gorton and Rouwenhorst, 2006), the more recent research shows evidence of increased co-movement between the commodity and stock markets since both markets are underpinned by some common factors and because commodities are being hugely financialized (see, e.g., Cheung and Miu, 2010; Daskalaki and Skiadopoulos, 2011; Silvennoinen and Thorpy, 2013; Tang and Xiong, 2010).

Empirically, the dependence relationship between stock and commodity markets has often been examined through assessing the correlation coefficient and using different multivariate models. For example, Büyüksahin et al. (2010), Chong and Miffre (2010), and Creti et al. (2013) use the dynamic conditional correlation model to study the co-movement of commodity and equity indices. Choi and Hammoudeh (2010), Cheung and Miu (2010) and Chan et al. (2011) employ a Markov-switching model to examine the return or volatility of commodities and equities and analyze the regime-switching correlation behavior. Bhar and Hammoudeh (2011) examine the dynamic interrelationships among four highly internationally traded commodities (oil, copper, gold and silver) and three commodity-relevant financial variables including short-run interest rate, exchange rate and the world equity index in a regime-switching environment. Mensi et al. (2013) use a vector autoregression and generalized autoregressive conditional heteroscedasticity (GARCH)-based bivariate model, VAR(1)-GARCH(1,1), combined with constant conditional correlation, to explore the relationship between commodity and stock markets. Silvennoinen and Thorpy (2013) apply double smooth transition conditional correlation-GARCH models in their research. Gao and Liu (2012) employ a switching autoregressive conditional heteroscedasticity (ARCH) model to investigate the dependence between regime-switching patterns of certain commodity groups and stocks. Although the multivariate GARCH or the Markov-switching models are able to describe the joint dynamics of returns, the underlying assumption is that innovations follow a symmetric multivariate normal or Student-t distribution. Thus, they fail to reflect the asymmetric tail dependence behavior between markets (see, Wang et al., 2013).

Our study of the China's commodity-stock market co-movements contributes to the related literature along two axes. First, it investigates the commodity-stock market dependence structure using copula functions. This approach is more flexible than the one based on parametric bivariate distribution functions, as it allows one to separately model the marginal behavior of the commodity and stock prices and the dependence structure. Furthermore, copulas simultaneously provide information on average dependence and upper and lower tail dependence (e.g., joint extreme co-movements), which is crucial to make portfolio allocation decisions and design risk management strategies. Second, since the knowledge of cross commodity-stock market linkages is useful for investors such as those in China who seek portfolio diversification and investment protection against downside risk, we investigate the implications of average and tail dependence in the stock-commodity markets in China for risk management by comparing