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Modeling asymmetric and dynamic dependence of overnight and daytime returns: An empirical evidence from China Banking Sector

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ABSTRACT

Different from previous literature which investigate the dependences between financial variables of interest on close-to-close returns, in this paper we study the dynamic dependence structures between each pair of the overnight (daytime) returns of four major bank shares in China A share market using copula-GARCH models. Besides, to examine the impact of the creation of the CSI 300 stock index futures on the dependence structure, we use the date (April, 16, 2010) when the index futures was launched to break the entire sample into two subsamples. Our results show that the dependences between each pair of overnight (daytime) returns are time-varying. Moreover, the magnitude of the dependence decreases substantially after the creation of the CSI 300 index futures. Additionally, in general the correlations (dependences) between each pair of daytime returns are larger than the correlations (dependences) between each pair of overnight returns, especially for the period after the creation of the index futures.

1. Introduction

Chinese stock market has developed rapidly during the last two decades. According to Wind Database, the total market value of the Shanghai and Shenzhen stock markets had reached RMB[1] 37.25 trillion (about US$ 6.09 trillion) at the end of 2014. With the rapid development of China's stock market, many scholars are paying their attention to the relationship between the Chinese and international markets or the microstructure of this special market, but most of them use close-to-close returns. For example, Xu (2000) investigates the time series properties of stock returns and volatility of the Chinese stock market by applying autoregressive models. Wang and Di Iorio (2007) test the market integration hypothesis in three China-related stock markets under the Capital Asset Pricing Model framework. Based on Diebold and Yilmaz's (2012) forecast-error variance decompositions in a generalized vector autoregressive framework, Zhou et al. (2012) study the directional volatility spillovers between the Chinese and world equity markets. Using multivariate vector auto-regression method, Cong et al. (2008) study the interactive relationships between oil price shocks and Chinese stock market.[2] With regard to other emerging markets, Ning and Wirjanto (2009) investigate the extreme return–volume relationship in six emerging East-Asian equity markets using copula method and find evidence of significant and asymmetric return–volume dependence at extremes for these markets. Turgutlu and Ucer (2010) model the dependence between the worlds leading stock markets and those of the emerging market groups using mixed copulas. Christoffersen et al. (2012) propose a new dynamic asymmetric copula model to capture long-run and short-run dependence, multivariate non-normality and asymmetries in large cross-section. They find that correlations in developed markets and emerging markets have increased markedly, but they are much lower in emerging markets than in developed markets. Narayan et al. (2014a) examine the dynamic relationship between stock returns and mutual fun flows in India using a generalized vector autoregressive model. Westerlund et al. (2015) test the efficient futures market hypothesis of 17 commodities using a newly developed factor analytical approach. Narayan et al. (2014b) test for predictability of excess stock returns for 18 emerging markets. They show that investors in most countries where short-selling is prohibited could make significant gains if limited borrowing and short-selling were allowed.

Different from the studies which study the dependences between financial variables of interest using close-to-close returns, this paper aims

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[1] RMB is the abbreviation for Renminbi, which is the basic unit for Chinese currency.

[2] There are a large number of papers focusing on the relationship between the crude oil and equity markets. See for example, Kilian and Park (2009), Narayan and Narayan (2010), Filis et al. (2011), Narayan and Sharma (2011), Wang et al. (2013), Phan et al. (2015a, 2015b) and references therein.

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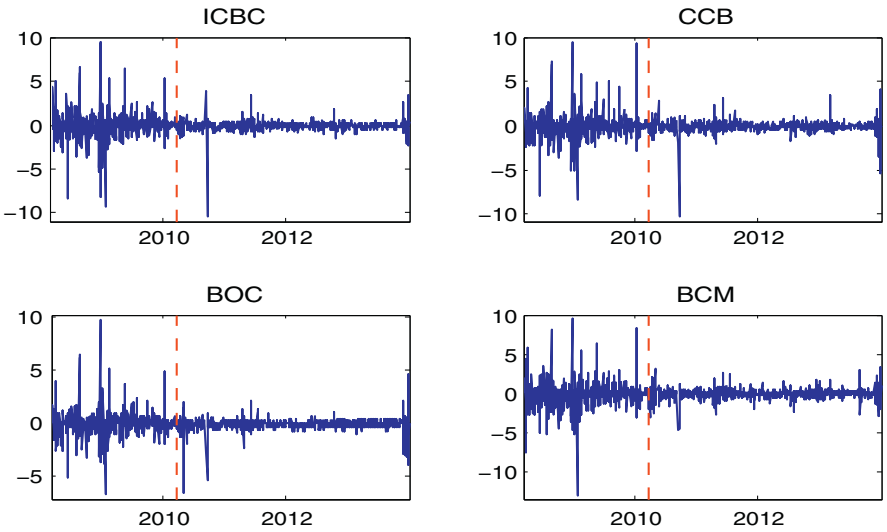

Fig. 1. This figure plots the overnight log returns of ICBC, CCB, BOC, BCM from September 26, 2007 to December 31, 2014.

to investigate the dynamic dependence structures between each pair of the overnight (close-to-open) returns and each pair of the daytime (open-to-close) returns of four major bank shares in China. In the previous literature there are studies focusing on the difference of the distribution properties between the overnight returns and the daytime returns. For example, Keim and Stambaugh (1984) and Wang et al. (2009) find that means for the daytime returns are larger than that of overnight returns, while (Cliff et al., 2008) get the converse result. Branch and Ma (2006) and Wang et al. (2009) show that daytime returns and overnight returns are significantly negatively correlated. However, the empirical results of (Gallo et al., 2001) show that daytime returns and overnight returns are not significantly negatively correlated. Regarding volatility behavior, it is shown in the literature that in general the volatility of daytime returns is larger than that of overnight returns (French and Roll, 1986; Lockwood and Linn, 1990). However, to the best of our knowledge no study has been done on the dependence structure between overnight returns and daytime returns except for Kang and Babbs (2012), who investigate the joint dynamics of overnight (daytime) returns for multiple assets using copula-GARCH models.

The literature on the dependence structure between financial markets generally falls into either correlation or copula frameworks. With regard to correlation-based studies of dependence, Longin and Solnik (1995) demonstrate that the correlations between major stock markets increase in periods of high volatility using monthly stock indices data for several industrial countries based on a multivariate GARCH model. Similar conclusions are also obtained by Ang and Bekaert (2002), Ang and Chen (2002) and Chakrabarti and Roll (2002), where one of the major finding is that international stock correlations tend to increase over time. However, as suggested by previous studies, the financial data is usually not Gaussian distributed (see, e.g. Longin and Solnik, 2001). The inference based on Gaussian assumption might be misleading if the data is not Gaussian distributed (Embrechts, 2009a, 2009b; Embrechts et al., 2002). Moreover, the correlation between financial assets under extreme conditions cannot be distinguished using a multivariate Gaussian model, which focuses more on the normal conditions.

Copula function introduced by Sklar (1959) has become a popular method to model the dependence structures between financial

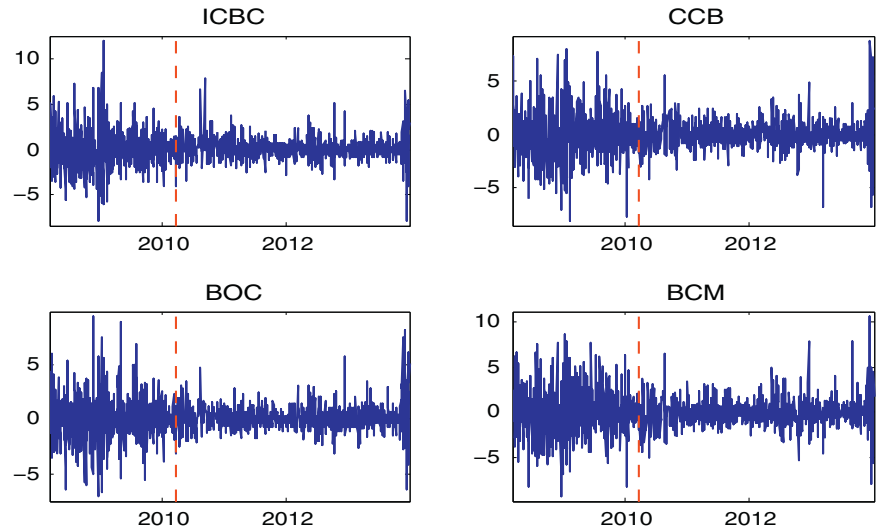

Fig. 2. This figure plots the daytime log returns of ICBC, CCB, BOC, BCM from September 26, 2007 to December 31, 2014.