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Transmission Mechanism of Stock Market Volatility
between China and the U.S. Empirical Evidence during Subprime Crisis from EDCC-GARCH Model

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Abstract This paper studies the dynamic correlation between Chinese and the U.S. stock market prior and posterior to the 2007 Subprime Crisis. By incorporating timc-diffcrcncc in our empirical study wc analyze the possible existing transmission mcchanism between these two markets by using EDCC- GARCH model and concludc that EDCC-GARCH model could well dcpict the relationship between Chinese and U.S. stock market. Furthermore?the performance of the U.S. market 1 -day ago would lead
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Key Words financial markets; volatility; correlation analysis; ED)CC-GRCH model

Introduction
Measuring the temporal and intertemporal relationships between different financial markets is a long-lasting research topic of risk management and portfolio construction. Since 2008 the Subprime Crisis has swept the whole world and seriously affected the economic growth in China. As the negative impact of the crisis has gradually retreated from the financial markets around the world after 2010 lots of research have been conducted by both policy makers and researchers. However there are lots of questions still need to be answered such as " How well can we depict the relationship between Chinese and the U.S. financial markets?" " How could the volatility of the U.S. financial market transmit to Chinese market?" Transmission Mechanism of Stock Market Volatility between China and the U.S. Empirical Evidence during Subprime Crisis from EDCC-GARCH Model Jinquan Liu Yueling Luo Guanglin Ji (Center for Quantitative Economics Jilin University) Abstract This paper studies the dynamic correlation between Chinese and the U.S. stock market prior and posterior to the 2007 Subprime Crisis. By incorporating timc-diffcrcncc in our empirical study wc analyze the possible existing transmission mcchanism between these two markets by using EDCC- GARCH model and concludc that EDCC-

GARCH model could well dcpict the relationship between Chinese and U.S. stock market. Furthermore?the performance of the U.S. market 1 -day ago would lead Chinese market move to the same direction. Thc dynamic correlation cocfficicnts from 2005 to 2010 suggest that the relationship between Chinese and the U.S. stock markets bccomcs more stable with the developing of Chinese financial market. Key Words   financial markets; volatility; correlation analysis; ED)CC-GRCH model Introduction Measuring the temporal and intertemporal relationships between different financial markets is a long-lasting research topic of risk management and portfolio construction. Since 2008   the Subprime Crisis has swept the whole world   and seriously affected the economic growth in China. As the negative impact of the crisis has gradually retreated from the financial markets around the world after 2010   lots of research have been conducted by both policy makers and researchers. However   there are lots of questions still need to be answered such as   " How well can we depict the relationship between Chinese and the U.S. financial markets?" " How could the volatility of the U.S. financial market transmit to Chinese market?" In order to analyze and measure the relationships between different financial markets   correlation analysis is one of the most important tools. Mostly?practitioners would use two methods-constant and dynamic conditional correlation coefficient. Most researchers view the latter as the better way for analyzing the real-time relationship between the two different series. However   in a large number of economic and financial literatures   ARCH model has become the standard research tool for volatility modeling   particularly on correlation of volatilities. In the past several years   both the univariate and the multivariate GARCH model (MGARCH model   have been thoroughly studied for relevant researches \n financial econometrics. Since Bollerslev (1990) developed the constant conditional correlation GARCH model (henceforth   the CCC-GARCH model)   multivariate analysis has become an essential framework for understanding the relationship between the (co) volatilities of several economies and markets. Besides   this model well contained the tools mentioned previously. Engle (2002) extended the CCC-GARCH model to the dynamic conditional correlation   after which proposed the DCC-GARCH model. Furthermore   He and Terasvirta (2004) raised the extension of constant conditional correlation GARCH model (henceforth   the ECCC-GARCH)   and argued that this model would better exhibit the correlation structures of different financial series. Most studies analyze and measure the correlation between Chinese financial markets by using ARCH-type model   especially DCC-GARCH model proposed by Engle (2002). For Example   Fan and Zhang (2003) analyzed the volatility of Shanghai and Shenzhen stock markets by using genetic algorithm and MGARCH model. Li and Zhang (2007) studied the spurious persistence in the correlation of Shanghai and Shenzhen stock markets by using multivariable structural change TGARCH model. Qin and Zheng (2008) employed ADCC model to predict the correlation of Chinese main stock indices. However   the DCC-GARCH model is buiit on the assumption that non-diagonal matrix elements are zero   which excludes the " spillover effects" from the model. Until now?a large number of literature have found that the lag of conditional variance tend to affect the volatility of another variable in financial market. Thus   some biases would arise if we apply this model to the analysis in which spillover effect exists. On the contrary   the EDCC-GARCH model considered in this paper circumvents the problems mentioned above. The reason why we extend the DCC-GARCH model is that this generalization allows us including the volatility spillover effect between

Chinese and the U.S. stock markets. Based on this specification EDCC-GARCH model can solve the problem on correlation and depict the volatility spillover effect between different financial markets by assuming nonzero of all the elements in the coefficient matrix. Statistically speaking the diagonal elements in the parameter matrix of MGARCH model reflect the (auto) correlation of every specific variance-covariance series and non-diagonal elements reflect the correlations between different series. So this specification for the correlation coefficients not only con