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Copula model dependency between oil prices and stock markets: Evidence from China and Vietnam

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ABSTRACT

The uncertainty of a country's economy, especially emerging economies, is partially due to the fluctuating of oil prices. There is also a growing concern about the relationship between oil price and stock markets in developing countries due to their heavy dependence on oil prices co-movements. This paper attempts to understand the relationship between China and Vietnam markets using nonparametric (chi- and K-plots) and parametric (copula) methods. We observe that the left tail dependency between international oil prices and Vietnam's stock market while Chinese market shows opposite results. These findings provide a new insight into the behavior between oil prices and stock markets, thus leading to meaningful implications for policy makers, investors and risk managers dealing with these two markets.

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1. Introduction

Oil is one of the most important commodities in global financial markets. It is considered as the life-support of many economies and may serve as the underlying asset in the trading of various financial instruments. For example, expensive fuel can cause higher transportation costs, as well as inflating prices of goods and services, which can in turn incite concerns about inflation. Hence, consumers will be more restrained in their spending which may reduce demand for goods and services. This in turn may

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cause decline in corporate profits and earnings. This can send inflationary signals to policy-makers and the central banks which can effect on oil pricing. In recent literature, numerous studies have examined the behavior of oil price changes and stock prices which show a direct relationship between the two. These studies used data from developed and developing countries. Many interesting examples of these relationships can be found in the literature. For example, Huang et al. (1996), observed that the oil futures returns are uncorrelated with stocks return with the exception of oil firms returns. Jones and Kaul (1996), noted that stocks and oil prices in US and Canadian markets are correlated, with the exception of UK. Moreover, Faff and Brailsford (1999), Sadorsky (1999, 2001) found that the oil prices volatility have asymmetric effects on stocks. Among others who contributed in this area are, Aleisa et al. (2003), Hammoudeh et al. (2004), El-Sharif et al. (2005), Lanza et al. (2005), Anorou and Mustafa (2007), Basher et al. (2010), and Park and Ratti (2008). Some of these studies used data from emerging economies such as Canada, Europe, US and UK. Recently, Papapetrou (2001) studied this relations on Greek market whereas the Gulf countries are considered in Hammoudeh and Eleisa (2004), and Maghyereh and Al-Kandari (2007), the studies on Chinese data is done by Cong et al. (2008) and Vietnam in Narayan and Narayan (2010).

Papapetrou (2001) used a multivariate vector-autoregression (VAR) approach to test the dynamic relationship between oil prices, real stock prices and interest rates, in relation to real economic activity and employment for Greece. He observed that changes in oil prices affect real economic activities, employment and stock price movements. Hammoudeh and Eleisa (2004) used VAR, likelihood ratio and cointegration tests based on Schwarz (SIC) and Akaike (AIC) for understanding the relationships between stock markets and oil prices for the Gulf Cooperation Council (GCC) member countries (excluding Qatar). They found that only the Saudi stock market index can be predicted based on New York Mercantile exchange oil futures prices. So, the Saudi Market is heavily dependent on oil prices. Saudi Arabia being the largest member county of GCC may have some sort of spillover effect on the rest of the small gulf states.

Maghyereh and Al-Kandari (2007) examined the linkages between oil prices and stock markets in the GCC countries using nonparametric rank tests for nonlinear co-integration analysis. They concluded that oil prices directly impact the stock price indices in the GCC countries in a nonlinear fashion. Anorou and Mustafa (2007), used Johnson and Juselius co-integration tests and suggested that oil prices and stock markets are not co-integrated during their study period (January 1993–August 2006). However, the results from the Gregory–Hansen co-integration tests reveal that oil and stock markets are co-integrated (Narayan and Narayan, 2010). Moreover, Park and Ratti (2008) looked into the effect of the shocks that occurred in oil prices on stock exchange returns in USA and 13 other European countries using VAR model and the data between 1986 and 2005. They found that the oil price shocks had a strong effect on stock returns with the exception of USA.

Recently, Arori and Christophe (2011) studied the long term links between oil prices and stock markets in GCC countries using bootstrap panel cointegration and seemingly unrelated regression (SUR). Their results show that there is evidence for cointegration between oil prices and stock markets in GCC countries, while the SUR results indicate that oil price increases have a positive impact on stock prices, except in Saudi Arabia. Most of the above studies used existing techniques to establish some sort of obvious relationship between the two variables.

The main objective of this paper is to study the dependence structures and/or tail dependence between oil price changes and stock market indices. The tail dependence helps to determine whether the two variables move together in the same or opposite directions. This paper employs two relatively new methods, namely the Plots (Kendall or K plot and chi plot) based on nonparametric method and the copula, based on parametric method. It uses oil prices and stock indices data from China and Vietnam to study the dependence structure of the fat tailedness of the distributions of oil and stock prices. These countries were selected for discussion, as China is the second largest world oil consumer, and Vietnam is the major non OPEC regional crude oil exporter and one of the rapidly growing economies in Southeast Asia. Therefore, the connection between these two countries' economies and international oil and stock markets is of great interest to academics and policy makers. Recently, Cong et al. (2008) investigated the interactive relationships between oil price shocks and the Chinese stock market using multivariate VAR. They concluded that oil price shocks do not show a statistically significant impact on the real stock returns of most Chinese stock market indices, except for manufacturing index and

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