



Revisiting the shock and volatility transmissions among GCC stock and oil markets: A further investigation[☆]



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ABSTRACT

The paper explores the empirical evidence of the volatility interactions among the Gulf Cooperation Council (GCC) stock markets and world oil price over the weekly period spanning from June 24, 2005 to March 25, 2011. The study is conducted based on the BEKK-GARCH process developed by Kroner and Ng (1998) and outlining the asymmetry in the conditional variances of the stock and oil markets. The findings show evidence of shock and volatility linkages among GCC stock and oil markets, and reveal that the spillover effects are more apparent for volatility patterns. They also indicate that the stock and oil markets exhibit asymmetry in the conditional variances. From the perspective of portfolio strategies, the results display certain sensitivity to the GCC stock prices, allowing thus better understanding of the relationship between each stock market and oil price. Our findings are crucial for practitioners, policy makers and investors who seek to make earnings by diversifying their portfolios.

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1. Introduction

The analysis of causal links among stock and oil markets has important implications for energy policy and international portfolio diversification. In addition, the study of volatility spillovers can help finance practitioners to build an accurate asset pricing process, and better predict volatility of the stock and oil markets. Moreover, investors would be able to anticipate fluctuations in their portfolio values due to oil and stock price shocks. From the perspective of portfolio strategies, the analysis of spillover effects may be helpful in improving the conditional volatility and covariance estimates that are used to compute the optimal weights and hedge ratios for oil/stock portfolio holdings.

The paper addresses the issue of volatility interdependence among stock and oil markets for the GCC region in order to identify markets that provide a channel for international diversification over high fluctuation periods. The study of such interdependence can help GCC policy makers to regulate the stock price markets. We also examine portfolio strategies by computing the optimal weights and hedge ratios for oil/stock portfolio holdings to highlight the potential gains of cross-market hedging and the sharing of common information by market

operators. The analysis of the links among GCC stock and oil markets is motivated by the fact that the GCC countries are linked economically, and consequently, a shock in one stock market can affect simultaneously all the other stock markets. In addition, as major oil-exporters in the world, the GCC countries could undergo the consequences of oil price shocks on their stock markets. On the other hand, the oil market could be affected by the fluctuations occurred in GCC stock markets since they are largely segmented from international markets and can be influenced by regional and global events.

Compared to previous studies, that focuses on bivariate processes in the overwhelming majority of cases when examining the volatility transmission between GCC stock markets and global factors, our paper offers a more comprehensive analysis of these issues by employing a BEKK-GARCH process, including simultaneously, all stock and oil markets. The use of this process allows us to investigate the shock and volatility links not only for the oil/stock pairs but also for stock market pairs, and to examine the asymmetry effects to see whether the market volatility is sensitive to negative shocks. We are also distinguished from the related literature on the volatility interactions for the GCC region by the use of tests of causality in conditional variance to confirm the insights drawn from the estimate results of the model. Our modeling manner is advantageous since it allows drawing of reliable conclusions on the behavior of GCC stock and oil markets in terms of shock and volatility transmission.

The obtained findings indicate the presence of spillover effects among GCC stock and oil markets in terms of shock and volatility, and asymmetric responses to negative shocks between markets. The

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optimal weights and hedge ratios for oil/stock portfolio holdings vary across GCC stock markets, which imply the necessity to apply a sophisticated econometric framework to better understand the links among GCC stock and oil markets. The results have important implications for investors, policy makers and finance practitioners.

The remainder of the paper is organized as follows. Section 2 presents a literature review related to the links between GCC stock markets and global factors. Section 3 outlines the econometric techniques used to address the issues raised in the paper. Section 4 reports summary statistics and stochastic properties of the data. Section 5 discusses the estimate results. Section 6 concludes the paper and characterizes the policy implications of the results.

2. Literature review

For GCC countries, the empirical studies related to the relationship between stock markets and global factors in terms of shock and volatility drew the attention of many researchers in the literature in the last decade. In this context, Hammoudeh and Choi (2006) employ cointegration techniques to study the short- and long-run linkages between five GCC stock markets (Bahrain, Kuwait, Oman, Saudi Arabia and UAE), oil price, S&P 500 index and US interest rate based on weekly data. They find evidence of short-run unidirectional causal links among GCC stock markets in most cases. The global factors do not affect the stock markets, except for the interest rate that influences some markets. For the same group of countries but based on daily data, Zarour (2006) makes use of a VAR process to show that the GCC stock markets significantly respond to oil price shocks. By cons, only the Omani and Saudi stock markets affect oil price. The author also reveals that for Saudi Arabia, the stock market is more responsive to oil price fluctuations and vice versa.

Maghyereh and Al-Kandari (2007) test for nonlinear cointegration between oil price and four GCC stock markets (Bahrain, Kuwait, Oman and Saudi Arabia) based on daily data, and find that stock markets respond to oil price shocks in a nonlinear manner. Lescaoux and Mignon (2008) examine the short- and long-run relationships between world oil price and macroeconomic and financial factors for oil-exporting (including GCC countries) and importing countries based on causality tests, cross-correlations and cointegration techniques. Over the short-run, the authors show evidence of a significant connection between oil price and stock markets. They also find various long-run linkages between the variables, in particular unilateral causality running from oil to the other variables. The authors point to the important role of oil price on stock markets. Recently, Arouri et al. (2012) opt for various econometric methods to analyze the relationships between Brent oil price and stock markets for GCC countries over both the short- and long-run by including the MSCI (Morgan Stanley Capital International) index and US interest rate in the analysis. The authors find interesting results revealing causality running usually from oil price to stock markets over the short-run, and long-run dependence between oil and share prices. They also stress that stock prices respond more to negative than to positive oil price shocks.

The empirical works turn to the analysis of own volatility dependence and volatility spillovers between stock markets and global factors. Within this framework, Hammoudeh and Li (2008) employ the iterated cumulative sums of squares (ICSS) algorithm to detect volatility breaks, and investigate their effects on volatility persistence of five GCC stock markets. The findings indicate that most GCC stock markets respond more to major global facts and events than to local and regional factors. Malik and Hammoudeh (2007) study the volatility spillovers between US stock market, world oil price and major GCC stock markets (Bahrain, Kuwait and Saudi Arabia) using a BEKK-GARCH model over the period 1994–2001. The results show evidence of volatility spillover effects running from oil price to Gulf stock markets, and reveal that for Saudi Arabia there is volatility spillover from stock price to oil.

In the same context, Arouri et al. (2011) make use of a VAR-GARCH process of Ling and McAleer (2003) to investigate empirically the links between oil price and GCC stock markets in terms of returns and volatility over the period 2005–2010. The evidence is also examined over the pre- and post-crisis of 2008. The empirical results are of great interest for investors and policy makers, and indicate that there is return and volatility transmission between oil price and stock markets. Awartani and Maghyereh (2013) opt for the new method suggested by Diebold and Yilmaz (2009, 2012) to investigate the returns and volatility spillovers between stock markets and oil price in the GCC region over the period 2004–2012. They find bidirectional asymmetric links between oil and stock markets in terms of returns and volatility with more apparent links from oil to stock markets. They also stress the effect of the global financial crisis of 2008 on the results.

Within the same strand of volatility spillovers, but at the sector level, Hammoudeh et al. (2009) find significant results indicating that for the service, banking and industrial/or insurance sectors of major GCC countries there are volatility interdependence between the sectors within each country. More recently, Jouini (2013a) analyzes the spillover effects between world oil price and five Saudi stock sectors (telecommunications and information technology, industrial investment, insurance, energy and utilities, and banks and financial services) in terms of returns and volatility over the weekly period from January 10, 2007 to September 28, 2011 based on the VAR-GARCH model. The results show evidence of unidirectional return spillovers from oil price to some stock sectors, and bidirectional volatility patterns with more apparent linkage from stock sectors to oil price. The author also computes the optimal weights and hedge ratios for oil/stock portfolio holdings to better understand the relationship between oil price and stock sectors. The results have important implications for investors, policy makers and practitioners.

The above empirical works are based on techniques applied on each country taken individually, i.e. techniques developed in the time series analysis. Few recent studies move to the panel data analysis in order to investigate the relationship between GCC stock markets and global factors. The corresponding authors motivate this approach by the fact that the GCC countries are linked economically, and therefore, techniques developed in this context can be used. In this framework, Arouri and Rault (2012) employ panel bootstrap unit root and cointegration tests to analyze the cointegrating relationships between oil price and four GCC stock markets over the period 1996–2007. The results show long-run links between the markets and indicate that oil price affects stock markets. More recently, Jouini (2013b) attempts to circumvent some shortcomings depicted in the study of Arouri and Rault (2012). Indeed, he investigates empirically the long-run relationship between GCC stock markets and global factors, namely Brent oil price, MSCI world index and US 1-month Treasury bill interest rate over the weekly period spanning from June 7, 2005 to October 21, 2008. He makes use of panel techniques that account for the effects of heterogeneity, dependence between countries and unknown regime-shifts. The results reveal long-run links between the variables of interest for the case of cross-country dependence, and indicate that most stock price markets are sensitive to the fluctuations of the considered global factors.

Our study offers a more comprehensive analysis of the shock and volatility transmissions among GCC stock and oil markets using relevant techniques developed in the class of multivariate GARCH-type models. Indeed, in contrast to previous works, we account for the effects of asymmetry in the estimation, and employ tests of causality in conditional variance. These additional tools allow us to draw reliable conclusions on the comovements among GCC stock and oil markets.

3. Econometric methods

We present the econometric techniques employed to implement the empirical issue raised in the paper, namely the asymmetric

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