



Dynamic spillovers between oil and stock markets in the Gulf Cooperation Council Countries



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ABSTRACT

This article exploits a new spillover directional measure proposed by Diebold and Yilmaz (2009, 2012) to investigate the dynamic spillover of return and volatility between oil and equities in the Gulf Cooperation Council Countries during the period 2004 to 2012. Our results indicate that return and volatility transmissions are bi-directional, albeit asymmetric. In particular, the oil market gives other markets more than it receives in terms of both returns and volatilities. These trends were more pronounced in the aftermath of the Global Financial Crisis in 2008 as the net contribution of oil has intensified after a burst during the crisis. The empirical evidence from the sample is consistent with a system in which oil is playing the dominant role in the information transmission mechanism between oil and equities in the GCC countries.

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1. Introduction

The spillover between the oil market and other stock exchanges is crucial for energy policy planning, portfolio diversification and energy risk management. Moreover, the volatility transmission mechanism provides insights that are important to design accurate models of stock valuation and risk premiums. Finally, the empirical information on spillovers may improve our estimate of conditional volatility, which is useful for certain applications in finance, such as option pricing, value at risk, portfolio optimization, and optimal hedging.

Theoretical models that relate oil and equity prices to common factors do not exist, although some empirical research suggests a relationship between systemic equity risk factors and oil prices. Much of this research relies on the interaction between oil price changes and macroeconomic growth in affecting corporate cash flows and discount rates.¹ For instance, the rise in oil prices is construed by markets as an unfavorable environment, which in turn, causes equity

prices to fall. This implies a negative correlation between oil returns and stock returns. On the other hand, during economic expansion, both oil and stock prices are expected to increase. Similarly, in oil producing countries, the accompanied increase in wealth and income to the rise in oil will affect positively equities, and hence, oil returns and stock returns might be also positively correlated.

While the channel effect from oil to stock returns may be explained by various stories, the reverse effect is more subtle. The stock market is forward looking, and hence, it may fall prior to an economic downturn, and rise before a recovery. On the contrary, oil prices depend on fundamentals of demand and supply and thus, they change contemporaneously with business cycles. This implies a negative correlation between oil and equity prices. Therefore, there could be some statistical regularity between oil returns and stock returns that is related to how these variables are behaving with the business cycle, as well as to the leading nature of the stock market.²

Furthermore, the oil market has recently undergone significant changes that may have impacted the relationship between equity and oil returns. Following 2004, the oil market was exposed to price shocks

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¹ For more details see Apergis and Miller (2009), Arouri et al. (2011, 2012), Basher and Sadorsky (2006), Jammazi (2012), Jones and Kaul (1996), Miller and Ratti (2009), and Soytaş and Oran (2011).

² There is no economic theory that underlies these channel effects. These thoughts were pointed to us thankfully by one of the referees.

due to increasing global demand.³ The influx of institutional capital into the oil market has also increased substantially, and this has contributed to oil price spikes and correlations. The linkages between oil and stocks through investment, speculation and arbitrage have strengthened. The co-movement had also intensified during and after the global financial crisis as investors attempted to liquidate their holdings to meet margin requirements in declining equity markets.

The objective of this paper is to investigate dynamic spillovers of returns and volatilities between world oil prices and stock market indices in the Gulf Cooperation Council Countries⁴ (the GCC hereinafter) during the period 2004 to 2012. The empirical evidence from the GCC gives new insights from a region with special characteristics. First, all economies in the GCC depend either directly or indirectly on oil.⁵ The oil revenue is the main determinant of earnings, government budgets, expenditures and aggregate demand. Hence, a positive correlation between oil and stock markets is expected. Second, these countries have experienced high economic growth,⁶ and have attracted a lot of capital in the wake of rising oil prices and oil market shocks after 2004. By 2011, the market capitalization in the GCC had reached \$719 billion. Several other factors have also played a vital role in this growth. These include, among others, the high level of liquidity after the surge in oil prices, the privatization schemes adopted by many countries, the opening up of markets for foreign investment, the increased degree of financial liberalization, and finally the setup of new institutional framework to attract investors. Third, compared to either developed or emerging markets, equity markets in the GCC are more segmented, and less integrated with international markets. Moreover, equity markets are located in a politically sensitive area and hence, Middle East politics and news are another source of volatility in these markets.⁷ The unique characteristics of these stock exchanges and the nature of their variability with oil prices may open up chances for regional and even world portfolio diversification and hedging.⁸ Hence, it would be interesting to investigate dynamics of transmission from oil to GCC stocks in terms of returns and volatility.

The return and volatility spillovers from oil to GCC stocks were the focus of many recent studies.⁹ Results were inconclusive. Specifically, the correlation of stock returns with oil prices was studied by Hammoudeh and Choi (2006). They used a vector-error correction (VEC) model, and found that changes in oil prices have no significant impact on equity indices. Malik and Hammoudeh (2007) examined the volatility, and shock transmission mechanism between stock markets and crude oil markets by using the multivariate GARCH framework. They reported significant volatility spillovers from the oil market to all stock markets except the Saudi market; where

significant reverse spillovers were recorded. Arouri and Rault (2010) used seemingly unrelated regression (SUR) system, and indicated the existence of a negative Granger causality from oil to equities. Moreover, Arouri et al. (2011) employed a vector autoregressive moving average GARCH (VAR–GARCH) model and showed substantial return and volatility transmissions between world oil prices and GCC stock returns.

Comparing the response of the GCC stocks to oil shocks, with the response of UK and US stocks was the focus of Fayyad and Daly (2011). They used unrestricted VAR model, and found that Qatar, UAE, and the UK have been more sensitive to oil shocks than other markets. Similarly, Zarour (2006) used the same model, and found that spills are faster during episodes of oil price increases. The inference on nonlinearity via cointegration tests was done by Maghyereh and Al-Kandari (2007) who stressed the importance of nonlinearity in describing the relationship between oil price shocks and other financial variables. In a more recent study, Arouri and Fouquau (2009) concentrated on short term spills and non-linear relationship between oil prices and GCC stocks by using a non-parametric approach. The study found significant nonlinear relationship between oil and stock markets in Qatar, Oman, and the UAE. Finally, Mohanty et al. (2011) investigated the link between oil price shocks and stock returns at the industry level, and found significant positive exposure in twelve out of twenty industries investigated in the GCC.

Our study extends the empirical work on the relationship between the oil market and equity markets by giving new insights into the direction of spills of returns and volatilities after 2004. The sample period includes a financial turmoil, and it witnessed oil price spikes, and increased correlations and interconnectedness between the oil market and other markets. The direction of spillovers are now possible to generate given a new set of spillover index measures, recently proposed by Diebold and Yilmaz (2009, 2012). These measures could be used to compute shocks to volatility (or returns) that spill across to GCC stock markets from the oil market. It is also possible to compute spillovers in the opposite direction. Therefore, it is now possible to assess the net contribution of the oil market in the information transmission mechanism that characterizes a system of variables composed of oil and stock exchanges in the GCC; and this is the objective of the paper.

The Diebold and Yilmaz (2009, 2012) method has several advantages over other models that have been applied in the previous studies.¹⁰ First, the measure is simple to compute and it does not depend on the Cholesky factor identification of vector autoregressive models (the VAR model). It is based on aggregating and offsetting invariant forecast error variance decomposition in vector autoregressive models of returns and volatilities: thus the results of variance decomposition do not hinge on the sequence of variables. Second, the measure is tractable, and it allows the measurement of the spillovers in returns or return volatilities across multiples of individual assets, classes of assets and markets over time. Therefore, the measure can be used to study spillovers from one market to multiple markets and vice versa. Third, the dynamics of the measure generated by a rolling window facilitates the study of both crisis and non-crisis episodes including trends as well as bursts in spillovers.¹¹ Finally, and more importantly, this method measures the shocks to volatility (or returns) of one market on any market (markets), and net of the aggregated impact in the reverse direction. This distinctive feature provides more information on directional spills than merely measuring the significance of a parameter that is estimated under a special variance structure, as in the multivariate GARCH models (Zhou et al., 2012).

Our results show that there are bi-directional spillovers between the oil market and the GCC block. These have intensified after the global-financial turmoil in 2008. Furthermore, we found that these transmissions

³ The growth in demand was mainly originating from China, the Middle East and India. In January 2000, the price of crude oil was \$24 per barrel. By June 2008, oil had increased to \$126 per barrel. However, by the end of 2008, oil prices had fallen to \$33. During that period, oil prices had increased together with equity prices, as well as with the overall growth of commodity demand.

⁴ The Gulf Cooperation Council countries consist of the following countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

⁵ They produce together more than 20% of the global output of crude oil, export 36%, and acquire 47% of verified reserves (see e.g., Arouri and Rault, 2010; Arouri et al., 2011; Hammoudeh and Elesia, 2004; and Malik and Hammoudeh, 2007).

⁶ The GDP growth has averaged almost 16% over the last 10 years, making the GCC as one of the fastest growing economies in the world.

⁷ See Fayyad and Daly (2011), Mohanty et al. (2011), Ravichandran and Alkhatlan (2010), and Yu and Hasan (2008).

⁸ Three issues might be of interest to investors here: 1 – the correlation with oil is expected to be positive and more positive over a longer period of time (unlike the nature in other stock markets, where it is expected to be negative). 2 – There might be significant diversification potential arising from market segmentation, within the GCC and with the rest of global stock exchanges. 3 – The high growth rate in market value and GDP, increases the appeal of these markets.

⁹ The literature outside the GCC focused on net oil importing countries. Significant spillovers were recorded in Arouri et al. (2012), Basher and Sadorsky (2006), Driesprong et al. (2008), Faff and Brailsford (1999), Filis et al. (2011), Hamilton (2009), Huang et al. (1996), Kilian (2008), Kilian and Park (2009), Jammazi (2012), Jin et al. (2012), Jones and Kaul (1996), Malik and Ewing (2011), Miller and Ratti (2009), Mohanty et al. (2010), Papapetrou (2001), Park and Ratti (2008), and Sadorsky (1999).

¹⁰ The common econometric methodologies applied in this context are the vector-error correction (VEC) and multivariate GARCH models.

¹¹ The measure is also computationally simple, and the vector autoregressive model can be estimated by using ordinary least squares. Furthermore, the multistep forecasting and forecasting errors and their decompositions are straight forward to compute.

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