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Crude oil prices and sectoral stock returns in Jordan around the Arab uprisings of 2010

Elie Bouri [a,*], Basel Awartani [b], Aktham Maghyereh [c]

[a] USEK Business School, Holy Spirit University of Kaslik, PO BOX 446, Jounieh, Lebanon
[b] Plymouth Business School, Plymouth University, Plymouth, UK
[c] Department of Economics and Finance, United Arab Emirates University, Al-Ain, United Arab Emirates

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ABSTRACT

In this paper, we test for mean and variance causality between world oil prices and sectoral equity returns in Jordan before and after the Arab Uprisings that started in 2010. The testing methodology is based on the sample of cross-correlation functions that are computed from the standardized residuals of a GARCH process. Our results show that the influence is not uniform across the equity sectors. The oil return shocks significantly impact the Financials and the Services sectors, while its effect is insignificant on the Industrials sector. This result is more pronounced in the period that follows the Arab Uprisings. In terms of risk transfer, we find that oil is a negligible risk factor. However, there is still a significant evidence of risk transmission to the Industrials sector particularly during the Arab Uprisings period. These results represent a unique information transmission mechanism that is useful for risk management and portfolio diversification.

1. Introduction

Studies of energy economics have increasingly focused on the role of crude oil prices in influencing stock markets' returns (Arouri et al., 2012; Cuando and de Garcia, 2014; Kang et al., 2015). A crucial issue in this strand of research is related to the effect of oil price return and volatility on stock market activities. Building on cash flow models which state that a stock price depends on expected discounted earnings, previous empirical studies have initially examined aggregate stock market return and volatility but have ignored the impact of oil prices on sectoral stock returns (see, inter alia, Arouri et al., 2011a; Ma et al., 2014; Bouri, 2015a). Given that crude oil is an intermediate input in the production process, not all equity sectors are affected equally by an oil price/volatility shocks. For instance, one would naturally expect that the oil and gas sector, and to a lesser extent the industrial and the manufacturing sectors, to be the most affected by the international oil market conditions. However, the services and financials sectors are expected to be much less affected by oil price returns and volatilities. Focusing on the cross-sector heterogeneity can help portfolio managers better diversify their portfolios across different equity sectors within a particular market to maximize returns and minimize risks. This may also help regulators formulate appropriate frameworks at the sector level.

The few studies that have focused on sectoral indices have mainly examined data from the US (Elyasiani et al., 2011; Qinbin and Mohammad, 2012; Broadstock and Filis, 2014) and Europe (Arouri and Nguyen, 2010; Arouri et al., 2012). In view of that, these studies have been based on the context of large oil-importing countries, with quite limited evidence provided on small oil-importing countries (Bouri, 2015a, 2015b). However, there is considerable evidence that stock markets in emerging countries, such as MENA (Middle East and North Africa) countries, are different from those of US and European countries in many important ways (see, inter alia, Mohanty et al., 2011). First, emerging countries in general, and MENA oil-importing countries in particular, are more vulnerable to oil price shocks than industrialized countries because they experience a rapid economic growth and are highly energy intensive (Bhar and Nikolova, 2009). Second, MENA oil-importing countries are largely segmented from developed stock markets (e.g. Yu and Hassan, 2008), suggesting that global investors in oil-importing countries' stocks are likely to achieve better

* Corresponding author. Tel.: +961 9 600 861; fax: +961 9 600 801.
E-mail address: eliebouri@usek.edu.lb (E. Bouri).

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risk-adjusted returns through international diversification. Third, the stock markets in MENA oil-importing countries are sensitive to regional political developments. Fourth, some prior studies have focused on oil-intensive industries such as the oil and the gas sector (El-Sharif et al., 2005; Ghouri, 2006; Boyer and Filion, 2007) and the airline and the transportation sectors (Luft, 2006; Morrell and Swan, 2006; Mohanty, 2011), while ignoring the less- and the non-oil-intensive sectors such as the industrials and the services sectors that can also be subject to oil shocks (Arouri et al., 2012). The few studies that have focused on sectoral indices in the MENA region have only considered oil-exporting countries in the GCC (The Gulf Cooperation Council)[1] region (Mohanty et al., 2011; Jouini, 2013). In major suppliers of oil, such as the GCC countries, the stock market reaction to changes in oil prices is usually stronger and bi-directional to some degree (Arouri et al., 2011b). This is due to the dominating role of the energy and gas sectors in those oil exporters compared to non-oil-related sectors such as consumer goods, services, and financials. Accordingly, the relationship between oil price changes and stock market returns is expected to be different (weaker) for sectoral indices in MENA oil-importing countries which have less oil-intensive sectors. Our paper differs from those conducted on GCC sectoral indices in using a different methodology that is based on mean and variance causalities and takes into account the effects of the political unrest that agitated most of the MENA region and affected oil supplies. In particular, we explore linkages between oil prices and sector level data from an oil-importing country, in our case, Jordan. This provides more nuanced conclusions about sectoral stock returns that capture some of the main heterogeneity across these equity sectors. Using different methodological framework and study periods, we address the voids presented in the abovementioned literature and argue that the effect of oil mean and variance on the country-level aggregate market index in Jordan tends to mask the heterogeneity of sector sensitivity to oil price returns and volatilities. In addition, the analysis evaluates the impact of the recent political uncertainty (Arab uprisings) that agitates the MENA region on the linkages between international oil market and Jordanian sectoral indices.

This paper complements a growing literature on the oil-stock nexus from a sectoral perspective, even though other global and macroeconomic factors could potentially affect the price discovery process and volatility of the Jordanian equity sector returns.

To proceed with the analysis, a methodology approach based on (CCF) cross-correlation function tests from Cheung and Ng (1996) and Hong (2001) is employed. Unlike the traditional causality test of Granger (1980) which suffer from a number of shortcomings that include the inability to test for causality in variance, the model building requirements, and the possible bias akin to omitted variables (Nakajima and Hamori, 2013), our methodology is simpler and allows for testing causalities both in the mean and the variance. More importantly, the CCF-based approach is conducted on standardized residuals and squared residuals of univariate ARMAX-EGARCH[2] models that account easily for the non-normality of the return series and the asymmetric responses to positive and negative shocks, making the construction of less flexible multi-dimensional models unnecessary. Similar CCF-based tests were employed by Nakajima and Hamori (2013) in testing causal relationships between wholesale electricity prices, natural gas prices, and crude oil prices.[3] In addition, we conducted several model selection criteria to decide which model has a superior fit, where usually an ad hoc approach has been used. This can help us to more accurately capture the causal relationship in both mean and variance between international oil prices and sectoral stock returns in Jordan. According to Javed and Mantalos (2011), misspecification in fitting a GARCH-based model can undermine the efficiency of the related estimators, leading to spurious results and potentially missed causalities.

This paper makes three main contributions. Firstly, unlike prior studies that generally focused on MENA oil-exporting countries, this paper considers the case of Jordan whose economy is not only heavily dependent on oil imports, but also has one of the most diversified and developed stock market in the MENA region (Bouri, 2014, 2015b). In this regard, the case of Jordan provides an adequate setting to assess oil-stock linkages as compared to other less diversified and less developed stock markets in MENA oilimporters (Bouri, 2014). This suggests a lower barrier to possible mean and volatility linkages between oil and Jordanian equity market sectors. Recognized by the groups of MSCI (Morgan Stanley Capital International) and Standard and Poor as a frontier market, Jordan is also on the watch list for potential future reclassification as an emerging market. As shown in Table 1, the stock market of Jordan is virtually fully accessible to foreign investors and has 234 listed companies belonging to three main sectors, namely, Financials, Industrials, and Services. The high ratio of market capitalization to GDP (gross domestic product) emphasized the importance of the Jordanian stock market in terms of the local economy (Bouri, 2014). As of December 2014, foreign holdings of Jordanian stocks reached 43.20%. Secondly, this paper uncovers hidden relationships between the oil market and sectoral stock returns, suggesting that investors need to be aware of the heterogeneity of equity sectors in Jordan in order to maximize cross-sector asset allocation decisions. Only few studies have already established that equity sectors tend to respond differently to oil price/volatility shocks in some MENA oil-exporting countries (Mohanty et al., 2011; Jouini, 2013). Nevertheless, these studies have not focused on the effect of the Arab uprisings on the relationship between the international oil market and sectoral stock returns. In this respect, and to the best of our knowledge, this is the first study examining the effect of the Arab uprisings on the sensitivity of sectoral indices to oil price and volatility movements in the MENA region using the causality in mean and variance tests in line with the procedures presented in Cheung and Ng (1996) and Hong (2001). Thirdly, this paper focuses on the events that had begun in Tunisia in December 2010 and have since then stirred the Arab world. In this regard, the sample period is divided equally into two periods around that time to investigate the asymmetrical impact of the Arab uprisings events on the relationships between the returns and the volatilities of international oil prices and the main sectoral indices in Jordan.

Our analysis yields interesting results: The sensitivity of the Jordanian stock market to oil price movements differs across industries and covers the two periods in question. Those results can help investors allocate their capital more efficiently during turbulent periods. In particular, our analysis refines the understanding on the timing and direction of the transmission of information between the crude oil market and Jordanian equity sectors during a period characterized by political instability. This can facilitate the assumption of hedge positions in response to external information shocks and improve the mean and variance forecasting in the Jordanian sectoral stock market.

Table 1
The Jordanian stock market in 2014.

Year of establishment	1999
Number of listed firms	234
Market capitalization (US$ bn)	25.12
Market capitalization/GDP	0.739
Turnover ratio%	12.270
Net foreign assets/GDP	0.270
Oil imports/GDP	0.112
Foreign ownership	0.432
Accessibility	Fully accessible

Notes: Listed stocks are the number of domestic listed companies. Turnover ratio corresponds to total value of shares traded during the period divided by the average market capitalization for the period. Source: Reuters DataStream.

[1] The GCC includes the following countries: Saudi Arabia, Bahrain, Qatar, Kuwait, United Arab Emirates, and Oman.

[2] ARMAX denotes the autoregressive-moving-average with an external input, whereas EGARCH denotes the exponential GARCH process.

[3] Numerous studies have employed the CCF tests, see, among others, Bhar and Hamori (2005), Stolbov (2014), Tamakoshi and Hamori (2014).