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OIL PRICE RISK EXPOSURE AND THE CROSS-SECTION OF STOCK RETURNS: THE CASE OF NET EXPORTING COUNTRIES

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Abstract

The main goal of this paper is to examine whether oil price risk is systematically priced in the cross-section of stock returns in net oil-exporting countries even after controlling for market and firm-level risk factors. Using firm-level data from the Gulf Arab stock markets, we find that stocks that are more sensitive to oil price changes indeed yield significantly higher returns, suggesting that oil price exposure can serve as a return predictor in these stock markets. However, we also find that it is the absolute exposure of a stock that drives returns, suggesting fluctuations in the oil price as a source of stock return premia in these markets. Our tests further suggest that a portfolio strategy based on a stock's absolute exposure to oil price risk yields significant positive subsequent returns as well, suggesting an investment strategy based on the absolute oil price risk exposure of stocks in net exporting nations.

JEL Classification: G11, G12

Keywords: Oil price risk; Financial market risk; Asset pricing; Equity returns

ملخص

الهدف الرئيسي من هذه الورقة هو دراسة مخاطر أسعار النفط بشكل منهجي في المقطع العرضي لعوائد الأسهم في صافي البلدان المصدرة للنفط حتى بعد ضبط عوامل مخاطر السوق وعلى مستوى الشركات. وباستخدام بيانات على مستوى الشركات من أسواق الأسهم الخليجية، نجد أن الأسهم التي تكون أكثر حساسية للتغيرات في أسعار النفط تحقق بالفعل عوائد أعلى بكثير، مما يوحي بأن كشف أسعار النفط يمكن أن تكون مؤشرا للعوائد في هذه البورصات. ومع ذلك، نجد أيضا أنه من الكشف المطلق للمخزون يدفع العائدات، مما يشير إلى أن التقلبات في أسعار النفط كمصدر يزيد عوائد الأسهم في هذه الأسواق. اختباراتنا تشير إلى أن زيادة المحفظة الاستراتيجية تقوم على كشف الأسهم المطلق لمخاطر أسعار النفط والذى يدر عائدات كبيرة إيجابية لاحقة أيضا، مما يدل على أن استراتيجية الاستثمار على أساس الكشف المطلق لمخاطر أسعار النفط من المخزونات في الدول المصدرة الصافية.

1. Introduction

Throughout the last half century, energy has played a significant role in the economic development of both importing and exporting nations, in some cases providing investors with clues about corporate profits and future performance of stock markets in these countries. Energy prices, in particular crude oil price as the main driver of the energy market, can affect stock prices through multiple channels. First, the price of oil can have a direct effect on corporate earnings and projected earnings growth rates which in turn affect cash flow values that go into stock valuation models (Jones et al. 2004). Second, oil price fluctuations can affect macroeconomic variables including GDP growth rates, inflation, exchange rates, etc. (Hamilton and Herrera 2004; Hamilton 2005) and thus, indirectly drive equity risk premiums which in turn affect discount rates applied to cash flows in stock valuation models. Third, volatility in oil prices can contribute to risk premiums required by investors on assets that have greater risk exposures with respect to oil price fluctuations. Depending on the sign of the risk premium associated with a firm's exposure to oil price, oil price sensitivity can positively or negatively affect stock prices. Therefore, the effect of oil price on the stock market largely depends on whether oil price risk is indeed priced at the firm level and, if so, the sign of the risk premium associated with a firm's risk exposure to oil price. Clearly, such inferences cannot be made using aggregate market or sector level data as aggregation would bypass valuable firm characteristics that potentially drive returns. Therefore, the main goal of this study is to provide a firm-level analysis of the effect of oil price risk exposure on stock returns from an asset pricing perspective. To the best of our knowledge, such a cross-sectional analysis at the firm level is the first in the literature.

Examining the relation between stock market returns and oil prices using firm-level data can provide valuable insight from several aspects. First, it allows one to test the significance of oil price exposure as a risk factor even after controlling for market and firm-specific factors. For example, it is possible that smaller firms are particularly more sensitive to oil price fluctuations and the size factor in an asset pricing model sufficiently accounts for the oil price risk exposure in stock returns. Second, comparison of firm-level returns sorted on their sensitivities to oil price fluctuations can provide valuable insight to the firm characteristics that drive oil price sensitivities, i.e. the nature of the firms that have greater risk exposures with respect to oil prices. Furthermore, this information can be used in hedging strategies to manage oil price risk exposures. Finally, from a corporate decision making perspective, identification of a risk premium associated with a firm's risk exposure with respect to oil price can help improve project (as well as IPO) valuations as investors would require a compensation for the added risk due to oil price risk exposure of firms.

This study contributes to the literature on the relationship between oil and stock markets by formally testing whether oil price risk is systematically priced in the cross-section of stock returns in net oil exporting nations, with a focus on the Gulf Cooperation Council (GCC) nations of Saudi Arabia, Kuwait, Qatar, UAE, Oman and Bahrain. Several characteristics of GCC stock markets make it especially interesting to examine the oil-stock market relationship using data from these developing stock markets. First, the GCC economies are largely dependent on oil exports with energy export revenues as a percentage of total exports ranging between a low of 60% for Bahrain and high of 95% for Kuwait (see Table 1). The region possesses about 48.5% of the world's proved oil reserves and controls 33% of oil exports globally.[1] With the oil sector accounting for a significant portion of their GDP, it can be argued that oil price fluctuations have direct effects on not only macroeconomic variables in these economies, but also corporate profits and earnings growth projections which in turn affect stock prices (see Figure 1). Second, the lack of risk management tools like futures and

[1] BP Statistical Review of World Energy (June 2013).

options available to investors in these developing markets may hinder investors' ability to hedge oil price risks in their portfolios. If investors have limitations on properly diversifying oil price risk in their portfolios, they will require a compensation for this undiversifiable risk; leading to a risk premium in stock returns associated with oil price risk exposure. However, since a liquid market for hedging exists in advanced financial markets, oil price risk would be considered as a diversifiable risk factor and oil price risk should not be priced in these markets.

Furthermore, following the Asian financial crisis in 1998, the stock markets of GCC countries experienced significant growth both in terms of market size and trading activity thanks to the flow of large sums of petro-dollars into these economies, creating an environment that can be characterized by the phenomenon "too much money chasing too few stocks" (Balcilar et al. 2013). To that end, GCC stock markets are different from other developing markets in the sense that they suffer from limited investment opportunities and under-populated stock exchanges and yet possess large amounts of cash available for investments thanks to oil export revenues. It can therefore be argued that oil-based revenues as the main driver of financing for these economies indirectly affects demand for equity securities in these under-populated stock markets and could be a major driver for mispricing in these markets. In fact, as our findings suggest, the book-to-market ratio as an indicator of the "cheapness" of a stock is a consistent determinant of returns in these markets. Finally, despite a number of institutional weaknesses and restrictions on foreign ownership (Balcilar et al. 2013), GCC stock markets have been implementing a number of market reforms in order to elevate themselves from frontier to emerging market status. In fact, Morgan Stanley Capital International (MSCI) has recently promoted two of the GCC markets, Qatar and UAE, to emerging market status which means increased international investments into these stock markets. Therefore, given the increasing accessibility of these markets for international investors, a significant oil premium embedded in these stock markets can be used to devise portfolio strategies for investors.

Looking ahead, our findings indicate that stocks that are more sensitive to oil price changes indeed yield significantly higher returns, suggesting that oil price exposure can serve as a return predictor in these stock markets. However, we also find that it is the absolute exposure of a stock that drives returns, suggesting fluctuations in the oil price as a source of return premia in these markets. The return spread between the highest and lowest absolute exposure portfolios ranges between a high of 4.173% per month for Saudi Arabia and a low of 1.416% per month for UAE, which is both economically and statistically significant. Interestingly however, our cross-sectional tests do not yield evidence of a statistically significant risk premium associated with oil price risk exposure in the presence of firm-level risk factors. This finding suggests that firm-level factors control for the oil price risk in returns, rendering the oil factor insignificant in our tests. Finally, we find that a portfolio strategy based on a stock's absolute risk exposure to oil price yields significant positive subsequent returns as well, suggesting a possible investment strategy based on the absolute oil price risk exposure of stocks in net exporting nations.

The remainder of this paper is organized as follows. Section 2 briefly discusses the literature on the relationship between oil and stock markets, section 3 explains the data and methodology, section 4 presents empirical findings and section 5 concludes the paper.

2. Literature Review

The relationship between energy and stock markets has been examined in numerous studies from different angles and in different contexts. One strand of the literature has focused on the effect of oil price on macroeconomic variables (e.g. Jones et al. 2004; Killian 2008; Cologni and Manera 2008, among others).[2] Another strand of the literature has examined the effect of oil price fluctuations on return and volatility in equity markets (Hammoudeh and Aleisa 2004; Chiou and Lee 2009; Choi and Hammoudeh 2010; among others). Starting with earlier studies focusing on industrialized countries (e.g. Jones and Kaul 1996; Huang et al. 1996), numerous studies in the literature have examined the effect of oil price on stock returns in the context of emerging stock markets. Examining the relationship between oil price shocks and stock market returns for 22 emerging economies, Maghyereh (2004) reports that higher level of energy consumption intensity for a country leads to greater sensitivity of its stock market to oil price shocks. Similarly, Basher and Sadorsky (2006) find strong evidence that oil price risk is relevant for explaining variations in stock returns. On the other hand, Nandha and Hammoudeh (2006) examine the relationship between market beta risk and stock returns in the presence of oil price risk and exchange rate sensitivity and find no evidence of country-level sensitivity to oil price measured in U.S. dollar. In more recent studies, Basher et al. (2012) document that positive shocks to oil prices tend to depress emerging market stock prices in the short run. Focusing on 12 oil importing European countries, Cunado and de Gracia (2013) document a negative impact of oil price changes on most European stock market returns. Similarly, focusing on the newly industrialized economies of China, Russia and India, Fang and You (2014) find mixed results on the effect of oil price shocks on stock returns. In a cross-sectional study, on the other hand, Aloui et al. (2012) find that oil price risk is significantly priced in emerging markets, and that the oil impact is asymmetric with respect to market phases.

Focusing on stock markets in net exporting nations, Hammoudeh and Aleisa (2004) find that only Saudi Arabia has a bidirectional causal relationship with oil price changes whereas Bashar (2006) notes that the predictive power of oil prices on the performance of GCC stock markets has increased following the boom in oil prices, with the greatest response to oil price shocks observed in the Saudi market. On the other hand, Hammoudeh and Choi (2006) document that oil price and the S&P 500 have no direct impact on GCC stock returns, implying the effectiveness of local or regional factors in these markets. Arouri and Rault (2012) find that oil price increases have a positive impact on GCC stock prices with the exception of Saudi Arabia. Adding support to earlier findings by Bashar (2006), Akoum et al. (2012) find that oil returns and the stock market returns in the GCC co-move over the long term and note an increase in the strength of market dependencies particularly after 2007. Similarly, Awartani and Maghyereh (2013) document significant return and volatility spillovers from the oil market to GCC stocks, more prevalently in the aftermath of the 2008 global crisis.

Despite the numerous studies on the interaction between oil and stock markets, the literature has largely examined the effect of oil prices on the stock returns either at the aggregate market index level (e.g. Basher and Sadorsky 2006; Park and Ratti 2008; Nanda and Hammoudeh 2007; Killian and Park 2009; Asteriou and Bashmakova 2013; Cunado and de Gracia 2013) or at the sector index or industry level (Malik and Ewing 2009; Gogineni 2010; Arouri et al. 2011; Mohanty et al. 2014). On the other hand, as Arouri et al. (2012) also point out, using aggregate data may mask important characteristics at the sector or firm-level that drive oil price exposures in the stock market, thus risk premiums embedded in stock prices. In a study that is more related to our approach, Mohanty et al. (2014) use asset pricing tests on monthly U.S. industry portfolio returns and find significantly negative oil price exposures for a number of subsectors including airlines, recreational services, and restaurants and bars. However, they do not utilize firm-level data in their tests and do not account for idiosyncratic volatility which has been shown to be a significant determinant of stock returns (e.g. Ang et

[2] Hamilton and Herrera (2004) provide a comprehensive survey of this literature.

al. 2006/2009; Fu 2009; and Chen and Petkova 2012). In contrast, this study utilizes firm-level data and examines whether the risk exposure of a stock with respect to oil price is a significant determinant of returns in the presence of firm-level factors including idiosyncratic volatility.

3. Data and Methodology

3.1 Data

We utilize data on all publicly listed firms in the GCC stock exchanges including Saudi Arabia, Kuwait, Qatar, United Arab Emirates (i.e. Dubai and Abu Dhabi stock exchanges), Oman and Bahrain for the period March 31, 2004 and March 31, 2013. The monthly (and daily) stock price, number of shares and book equity data are obtained from Bloomberg. Considering that the exchange rates in the GCC markets are largely pegged to the U.S. dollar, consistent with Bley and Saad (2012), we use the U.S. Treasury Bill rate as the risk-free rate (R_f) in our models. Finally, as a proxy of the global oil price, Brent crude oil price is used to calculate oil returns as this type of oil accounts for a large percentage of global oil consumption (Degiannakis et al. 2014).

3.2 Oil price fluctuations and stock market risk

In order to establish the preliminary evidence on the effect of oil price fluctuations on stock market volatility in GCC markets, we first use aggregate market index data and examine whether oil price fluctuations contribute to the conditional volatility of stock returns. For this purpose, we construct a relative oil price shock variable (*OS*) that measures the oil price shock relative to recent price trends by estimating

$$LO_t = \gamma_0 + \sum_{k=1}^{5} \gamma_k LO_{t-k} + v_t \qquad \textbf{(1)}$$

where LO_t is the logarithmic oil price for day t. In order to ensure non-negative values for the subsequent conditional volatility estimations, we define the positive oil price shock, $OS_t^+ = \hat{v}_t$ for positive values of the residual, $\hat{v}_t$, for day *t*. Similarly, the negative oil price shock is defined as $OS_t^- = |\hat{v}_t|$ for negative values of $\hat{v}_t$. In this way, we construct time series of positive and negative oil price shocks that are relative to recent price trends.

Having constructed time series of oil price shocks, we then estimate the following model of stock index returns by incorporating oil price shocks in the conditional volatility equation

$$R_{m,t} = \beta_0 + \beta_1 R_{m,t-1} + \varepsilon_t \qquad (2)$$

$$h_t = \delta_0 + \delta_1 \varepsilon_{t-1}^2 + \delta_2 h_{t-1} + \delta_3 vol_t + \delta_4 D_t^+ OS_t^+ + \delta_5 D_t^- OS_t^- \qquad (3)$$

where h_t is the conditional variance, $R_{m,t}$ and vol_t are the excess return on the stock market index and the change in logarithmic trading volume for day *t*, respectively. The dummy variable D_t^+ (D_t^-) equals 1 if the residual $\hat{v}_t$ for day *t* is positive (negative), and zero otherwise. This specification accounts for the well-established return and trading volume relation and examines if oil price shocks contribute to conditional volatility of market returns even after controlling for the effect of trading volume. Next, we explain the construction of portfolios based on oil price risk loadings and the estimation procedure for cross-sectional tests.

3.3 Estimating factor risk premiums

3.3.1 Effects of size and book-to-market factors

Asset pricing tests employed in this study explore the following research questions: (i) Do stocks with greater risk exposures with respect to oil price yield greater returns? (ii) Is oil price a significant determinant of stock returns even after controlling for firm-level factors including size, book-to-market ratio and idiosyncratic volatility? (iii) Does oil price risk exposure of a stock serve as a predictor of subsequent returns? For this purpose, we start our analysis by testing the significance of the size and book-to-market ratio effects well established in the asset pricing literature (e.g. Fama and French 1992/1993). The SMB (size) and HML (book-to-market) factors are constructed using the six value-weighted portfolios formed on the market value of equity (MVE) and the book-to-market (BtM) ratio for the firms in the sample. Based on the firm's MVE relative to the median MVE, in December of each year, stocks are assigned to two size portfolios (Big and Small). Independently, stocks are assigned to three book-to-market portfolios (Low, Medium, and High) based on the breakpoints for the bottom 30% and top 70%. Every month, the SMB (Small minus Big) factor is the average return on the three small portfolios (SL, SM, SH) minus the average return for the three big portfolios (BL, BM, BH). Similarly, every month, the HML (High minus Low) factor is the difference between return for the two growth portfolios (SL, BL) and the two value portfolios (SH, BH).

3.3.2 The effect of idiosyncratic volatility as a risk factor

Numerous studies in the asset pricing literature document an idiosyncratic volatility effect in the cross-section of stock returns although mixed results are documented regarding the sign of the effect. Studies including Ang et al. (2006/2009) document that stocks with high idiosyncratic volatility yield lower returns whereas later studies including Fu (2009) and Chen and Petkova (2012) find opposite results. Similarly, in one of the few papers dealing with asset pricing issues for GCC stock markets, Bley and Saad (2012) report mixed evidence on the effect of idiosyncratic volatility on expected returns depending on the estimation procedure for idiosyncratic volatility. Bley and Saad (2012) find a negative relationship between expected returns and lagged idiosyncratic volatility only in Saudi Arabia and Qatar when idiosyncratic volatility is estimated using the procedure adopted by Ang et al. (2009). On the other hand, they find that the relationship turns positive when conditional idiosyncratic volatility is estimated by EGARCH or AR Models. Despite the lack of consistent evidence on the effect of idiosyncratic volatility on stock returns, we nevertheless include this variable in our tests and control for idiosyncratic volatility.

In order to calculate idiosyncratic volatility, for each month and for each stock in the sample, we first calculate the total risk, defined as the variance of returns over the past 24 months.[3] The idiosyncratic risk is defined as the difference between the total risk and the systematic risk for the stock. For each month, the systematic risk is calculated as the product of the market model beta, based on the past 24 month returns for the stock and the market returns, and the variance of the market returns over the same 24 month period.[4] This way, we calculate the idiosyncratic volatility for each stock, each month. Having estimated each stock's idiosyncratic risk, in December of each year, we assign the stocks in the sample to three IV (idiosyncratic volatility) portfolios. While the Low-IV portfolio contains the bottom one-third stocks, the middle and top one-third stocks are assigned to the Medium-IV and Top-IV portfolios, respectively. Following the finding by Bley and Saad (2012) of a size and

[3] Drew et al. (2004) follows the same procedure to estimate the pricing effect of idiosyncratic volatility in Chinese stock returns.

[4] We require the stocks to have 24 months of continuous returns for these calculations. Stocks that do not satisfy this condition are excluded from this part of the analysis.

IV effect in GCC stock returns, we then construct six (SIZE,IV) portfolios and calculate the HMLIV (high minus low IV) factor as the difference between the average returns for the two high idiosyncratic volatility portfolios (SH, BH) and the average returns for the two low idiosyncratic volatility portfolios (SL, BL).

3.3.3 The oil price risk factor

Having created portfolios based on the well-established Fama-French risk factors and idiosyncratic volatility, we next extend our analysis by incorporating oil price as a possible risk factor and create portfolios sorted on stocks' risk exposures with respect to oil prices. We use the daily data to construct nine portfolios based on the factor loadings on market return and oil price changes. Each month, for each stock, we obtain the factor loadings on the market return by estimating

$$R_{i,t} = \beta_0 + \beta_{i,RM} R_{m,t} + \varepsilon_{i,t} \quad (4)$$

where $R_{i,t}$ and $R_{m,t}$ are the excess return for stock *i* and the market for day *t*, respectively, and $\beta_{i,RM}$ is the loading on the market factor for stock *i* for that month. To estimate the loadings on oil for each stock, each month, we estimate

$$R_{i,t} = \beta_0 + \beta_{i,RM} R_{m,t} + \beta_{i,O} R_{o,t} + \varepsilon_{i,t} \quad (5)$$

where $R_{o,t}$ is the return on the Brent crude oil for day *t*, and $\beta_{i,O}$ is the loading on oil for stock *i* during that month. First, we use the loadings on the market return to sort the sample stocks into three portfolios. Then, we sort each of these three portfolios into terciles based on the loadings on oil. This sequential sorting yields nine portfolios for each month based on the loadings on the market return and oil from April 2004 through March 2013.

Next, we run rolling regressions for each of the nine portfolio returns on the three Fama-French factors (market, SMB, and HML), the idiosyncratic volatility factor, and the oil factor in order to estimate the betas for each month. In particular, we use the following time-series regression model to estimate the coefficients for the Fama-French, idiosyncratic volatility and oil risk factors

$$R_{p,T} = \alpha_{p,t} + \beta_{p,t}^{m} R_{m,T} + \beta_{p,t}^{smb} R_{smb,T} + \beta_{p,t}^{hml} R_{hml,T} + \beta_{p,t}^{iv} HMLIV_T + \beta_{p,t}^{o} R_{o,T} + \varepsilon_{p,T} \quad (6)$$

where T = t-24, t-23, t-22, …, t-1. In this equation, $R_{p,T}$, $R_{m,T}$, $R_{smb,T}$, and $R_{hml,T}$ denote the excess return on portfolio p, the market, SMB and HML factors for month *T*, respectively. The idiosyncratic volatility and the oil risk factors are denoted by $HMLIV_T$ and $R_{o,T}$ for month T, respectively. $\beta_{p,t}^{m}$, $\beta_{p,t}^{smb}$, $\beta_{p,t}^{hml}$, $\beta_{p,t}^{iv}$ and $\beta_{p,t}^{o}$, are the sensitivities of portfolio p to the three Fama-French risk factors, the idiosyncratic volatility and the oil factor for month *t*, respectively. We obtain the betas by running rolling regressions where we roll a window of 24-month returns forward one month at a time. Since the sample period starts in April 2004, the betas are estimated for each month during April 2006 through March 2013 period.

Following the Fama and MacBeth (1973) methodology, we next use the beta estimates from the time-series regression in Equation (6) to estimate the second-step cross-sectional regression

$$R_{p,t} = \gamma_{0,t} + \gamma_{m,t} \hat{\beta}_{p,t}^{m} + \gamma_{smb,t} \hat{\beta}_{p,t}^{smb} + \gamma_{hml,t} \hat{\beta}_{p,t}^{hml} + \gamma_{iv,t} \hat{\beta}_{p,t}^{iv} + \gamma_{o,t} \hat{\beta}_{p,t}^{o} + \epsilon_{p,t} \quad (7)$$

where $\gamma_{m,t}$, $\gamma_{smb,t}$, $\gamma_{hml,t}$ $\gamma_{iv,t}$ and $\gamma_{o,t}$ denote the risk premium on each of the three Fama-French factors, the idiosyncratic volatility and the oil price risk factor, respectively. We then use the γ values to calculate the average γ , which represents the risk premium for factor *f*, as $\gamma_f = \frac{1}{N} \sum_{t=1}^{N} \hat{\gamma}_{f,t}$ where *N* is the number of months.

4. Empirical Results

4.1 Oil price shocks and market volatility

Table 2 reports several statistics based on the time series averages of cross-sectional means. Examining the idiosyncratic volatility values estimated using the procedure in Section 3.3.2, we observe that Saudi stocks have the highest average firm-specific risk. It is possible that a combination of high sectoral concentration of stocks and the relatively more segmented and closed nature of this market to foreign investors coupled with low institutional investor participation in the market contribute to the high level of idiosyncratic volatility relative to the other GCC markets. Clearly, high level of idiosyncratic volatility is an issue for investors in this market as investors will find it hard to diversify away firm specific risks in their portfolios, hurting benefits from portfolio diversification.

Table 3 reports the estimates for Equations 2 and 3 regarding the effect of oil price shocks on the conditional volatility of excess market returns. Consistent with the literature, we observe a positive trading volume-volatility relation in all markets indicated by positive and significant δ_3 estimates with somewhat weaker results for Bahrain and Oman. On the other hand, we find that oil price shocks have heterogeneous effects on conditional volatility across these net exporting markets. Negative oil price shocks are found to positively contribute to conditional volatility in all GCC markets with highly significant and positive δ_5 estimates observed. Similarly, positive oil price shocks are found to positively contribute to volatility in UAE, Kuwait, Qatar and Bahrain with no significant effect for Oman. On the other hand, we find the opposite result for Saudi Arabia where positive oil price shocks are found to have a negative effect on return volatility.

In a comparative study of the GCC stock markets, Arouri and Rault (2012) also note Saudi Arabia as an exception among these markets with a negative relationship between oil and stock returns observed for the Saudi market. They attribute the different results observed for Saudi Arabia to the economic and institutional differences between the Saudi market and other GCC markets. Arouri and Rault (2012) argue that the Saudi stock market is highly concentrated and largely dominated by the financial industry which creates a significant link between this market and Western financial markets. Furthermore, the economy in Saudi Arabia, a country ranked number one in oil exports globally, is heavily dependent on global demand for oil imports and this exposes the Saudi economy to imported inflation and economic pressures more than the other GCC countries. In fact, in a recent study, Degiannakis et al. (2014) document a similar negative relationship between oil price shocks and alternative measures of stock market volatility for European stocks and conclude that oil price changes due to aggregate demand shocks lead to a reduction in stock market volatility. To that end, the finding of a negative relationship between market volatility and positive oil shocks for Saudi Arabia is consistent with Degiannakis et al. (2014) and the different results obtained for the Saudi market compared to other GCC markets is consistent with Arouri and Rault (2012).

4.2 Market, size, book-to-market and idiosyncratic volatility effects

We begin our cross-sectional tests by first examining the significance of the well-established Fama-French risk factors. Table 4 presents the Fama-MacBeth (1973) cross-sectional regression coefficients for the nine portfolios sorted first by firm size and then by book-to-market ratios. In the table, M denotes the excess market return, SMB and HML are the Fama-French size and book-to-market factors, and IV is the idiosyncratic volatility factor. Following the discussion in Petersen (2009), in order to mitigate the effects of the time-series and the cross-sectional correlation prevalent in panel data sets, we apply the Newey and West (1987) adjustment on the standard errors and report the t-statistics in parentheses. Note that we perform country-based tests only for Saudi Arabia, UAE and Kuwait due to the limited number of firms listed in the other GCC stock exchanges (Table 1). Furthermore, these three countries are the highest ranking countries in oil exports globally compared to the other GCC countries (Table 1). However, similar to Bley and Saad (2012), we also run separate tests by pooling all GCC stocks in the sample in order to examine a possible GCC-wide oil price effect.[5]

The findings reported in Table 4 suggest that the market and size factors that are well-documented for the U.S. market do not apply to the developing GCC stock markets, with insignificant estimates for γ_M and γ_{SMB} observed in general. This finding suggests that firm size is not a significant determinant of returns in these developing markets. The finding of an insignificant market factor is also in contrast to the Capital Asset Pricing Model (CAPM) that suggests a positive relation between systematic risk and return. On the other hand, we observe a significant "book-to-market" effect, suggesting that a stock's "cheapness" may serve as a return predictor. Interestingly however, our tests yield a negative monthly risk premium for book-to-market ratio ranging between -2.116% for UAE and -1.493% for Saudi Arabia. This finding is in contrast with the evidence from advanced markets and implies a negative premium on stocks with high book-to-market ratios. The finding of a negative premium on what is called in the literature 'value stocks' may be due to significant mis-pricing on stocks in these markets.

Regarding the effect of idiosyncratic volatility on returns, Table 4 suggests a negative idiosyncratic volatility effect in the case of UAE and Kuwait. However, our findings on portfolios sorted on firm size and idiosyncratic volatility reported in Table 5 suggest that the idiosyncratic volatility effect is not consistent. The only exception to this is Saudi Arabia where idiosyncratic volatility is found to be significant with a monthly risk premium of 2.908%. In the case of GCC-pooled tests, our analysis does not yield any significant, common determinant of returns, implying heterogeneity in risk factors across these stock markets.

4.3 Oil price exposure

Following the two-step procedure explained in Equations 4 and 5, we estimate the oil price risk loading for each stock each month. At the end of each month, we sort stocks into terciles based on the value of oil price risk loadings for the month. Firms in Tercile 1 have the lowest loadings indicating stocks that are least sensitive to oil price changes. Similarly, firms in Tercile 3 are the most sensitive with the highest oil risk loadings. Having placed each stock in each tercile each month, we then create equally weighted portfolios and form time-series returns for each portfolio in Terciles 1 through 3. Table 6 reports the average returns for the three portfolios sorted on oil price risk loadings. Examining the findings reported in Panel A, we observe that stocks that are not sensitive to oil price changes (Tercile 2) generally yield the lowest returns. On the other hand, we observe that stocks that have the greatest risk exposure with respect to oil price, regardless of the sign of the exposure, yield the highest returns. For example, in Saudi Arabia, portfolios with the lowest (highest) risk exposure with respect to oil price yield an average monthly return of 2.647% (2.132%) estimated for Tercile 1 (3) whereas stocks that are not sensitive to oil price (Tercile 2) yield the lowest returns with an average of -0.732% per month. We observe that this pattern is consistent across all stock markets.

The findings in Panel A clearly suggest that it is in fact the absolute exposure of a stock with respect to oil price that drives returns. For this purpose, we report in Panel B, the average returns for the three portfolios sorted on the absolute value of oil risk loadings and observe that stocks with greater absolute exposures to oil prices indeed yield significantly higher

[5] GCC-pooled cross-sectional tests are done using dollar-based returns.

returns. For example in UAE, portfolios with the lowest absolute risk exposure with respect to oil prices (Tercile 1) yield a monthly return of 0.214% whereas portfolios with the greatest absolute risk exposure (Tercile 3) yield 1.630% per month, suggesting a 1.416% return spread that is significant both statistically and economically. The same monotonically increasing pattern between average returns and absolute oil exposures is observed in all countries with the largest spread observed in the case of Saudi Arabia (4.173% per month). Overall, our findings indicate that the absolute risk exposure of a stock with respect to oil price can serve as a return predictor in these net exporting markets. However, whether the observed "oil effect" remains to be significant after controlling for firm-specific factors is yet to be explored.

4.4 Oil price risk premium

Table 7 reports our findings for nine portfolios sorted first by market risk loadings and then by oil price risk loadings as explained in Equations 4 and 5. Each panel in the table reports the estimates for the CAPM and the (Fama-French, IV) models augmented with the oil price risk factor. The findings in Table 7 indicate that the oil factor is not significant in any alternative model specification and across all countries. This finding is consistent with the results reported in Panel A of Table 6 where we do not find a significant relationship between oil price exposures and average returns.

On the other hand, the tests performed using the absolute exposure to oil prices instead, reported in Table 8, yield significantly different results. We find a significant oil risk premium embedded in the cross-section of returns in UAE and Kuwait with a monthly risk premium on the oil price risk factor of 5.963% and 6.200% for these countries, respectively. However, the oil price risk factor becomes insignificant when we control for the market and firm-level risk factors, suggesting that firm-specific risk factors capture the effect of oil price risk. Interestingly, our tests on Saudi Arabia yield no evidence of a significant risk premium on the oil factor. Considering that Saudi Arabia ranks first in global oil exports, the finding of an insignificant oil effect on the cross-section stock returns in this market seems inconsistent. However, this finding may be due to possible mis-pricing of stocks in this market and the lack of an investment culture which ensures that risks are properly priced. We observe similar findings for the pooled sample of GCC stocks as well, most likely due to the inclusion of Saudi stocks in the pooled sample. Overall, our tests suggest heterogeneous oil price effects on the cross-section of returns in the GCC stock markets, with a significant oil price effect observed in UAE and Kuwait. On the other hand, we observe that oil price effect becomes insignificant after controlling for market and firm-level risk factors, suggesting that firm-specific factors capture the oil price effect.

4.5 Oil price exposure and subsequent returns

Having found mixed results on the effect of oil price risk in cross-sectional tests, we next examine whether profitable trading strategies exist based on a stock's risk exposure with respect to oil price. For this purpose, each month, we assign the stocks in the sample to one of two portfolios based on their absolute exposure to oil price (high/low exposure). We then calculate the subsequent 1, 2 and 3-month returns for portfolios with the highest and lowest absolute exposure to oil prices and examine the spread in returns for these portfolios. The spread represents the difference in returns between the high and low exposure portfolios. Table 9 presents our findings. Our tests yield significant subsequent returns in the case of Saudi Arabia. We find that portfolios with high absolute exposure to oil price fluctuations yield significantly higher subsequent returns than portfolio with low absolute exposures. The spread in subsequent returns is highly significant and positive for the next 1, 2 and 3 months with 1.107%, 1.973% and 2.122%, respectively. This finding suggests that a portfolio strategy with a long position in high oil exposure stocks and a short position in low oil exposure stocks can be utilized to generate excess returns in this stock market. Therefore, investors in this country should pay attention to the absolute exposure of stocks with respect to oil price fluctuations. A similar pattern is observed for the pooled sample of GCC stocks as well, suggesting a GCC-wide investment strategy based on the absolute oil exposure of stocks. On the other hand, our tests for UAE and Kuwait do not yield significant subsequent returns for this investment strategy.

5. Conclusion

The main goal of this study is to examine whether oil price risk is systematically priced in the cross-section of stock returns in net oil exporting countries. Using firm-level data on Gulf Arab stock markets, we test whether stocks with greater exposures with respect to oil prices yield significantly greater returns after controlling for market and firm level risk factors including size, book-to-market ratio and idiosyncratic volatility. Our findings indicate that stocks that are more sensitive to oil price fluctuations indeed yield significantly higher returns, suggesting that oil price exposure can serve as a return predictor in these stock markets. However, we also find that it is the absolute exposure of a stock that drives returns, suggesting fluctuations in the oil price as a source of time-variation in return premia in these markets. Interestingly however, our cross-sectional tests do not yield evidence of a significant risk premium associated with oil price risk in the presence of firm-level risk factors, suggesting that firm-level factors like firm size and idiosyncratic volatility controls for the oil risk in returns rendering the oil factor insignificant in our tests. Finally, we find that a portfolio strategy based on a stock’s absolute exposure to oil price fluctuations yield significant positive subsequent returns as well, suggesting a possible investment strategy based on the absolute oil exposure of stocks in net exporting nations.

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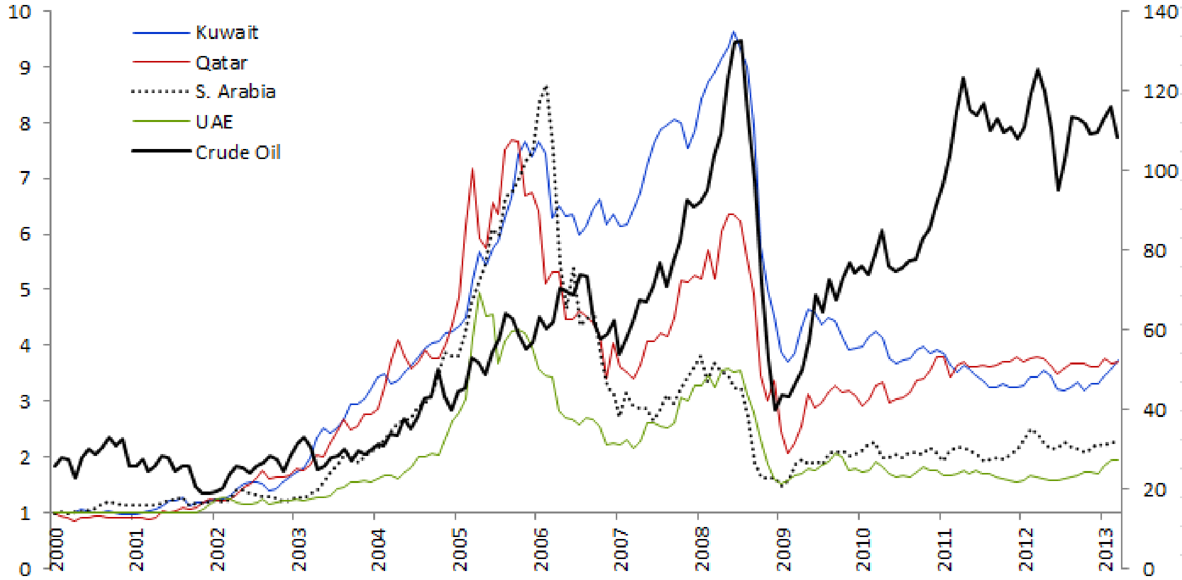
Figure 1: Nominal Stock Market Index Returns for Selected GCC Countries



Note: Market index values are rebased at one as of January 2000 for comparison purposes. Returns are calculated using local currency based stock market index values. Brent crude oil price is represented in the secondary axis.

Table 1: Stock Market and Economic Characteristics of the GCC Markets

	S. Arabia	UAE	Kuwait	Qatar	Bahrain	Oman
Number of listed firms	150	104	206	42	44	123
Market cap. ($billions)	338.9	71.3	100.9	125.4	17.1	19.7
Trading volume (million shares)*	152.1	324.4	228.3	9.8	37.2	22.5
Energy exports (% of total)	90	45	95	85	60	62
Oil exports global rank	1	6	10	18	34	27
Composition of GDP:						
Agriculture	1.9%	0.8%	0.3%	0.1%	0.4%	1%
Industry	64.8	56%	50.2%	73.6%	51.3%	66%
Services	33.3%	43.2%	49.5%	26.3%	48.4%	33%

Note: The data is compiled from the World Bank database (2011), the CIA World Factbook (2012) and Gulfbase. *Average daily trading volume (2013).

Table 2: Sample Description

	S. Arabia	UAE	Kuwait	GCC
Number of stocks	91	57	110	331
Book-to-market ratio	0.473	1.249	0.002	0.508
Idiosyncratic volatility	2.385%	1.667%	1.848%	1.785%

Note: The table reports the time series averages of cross-sectional means. Idiosyncratic volatility is the total risk (in percent) not explained by the market factor, i.e. the firm-specific risk, averaged across stocks. UAE refers to the combined list of stocks from the Dubai and Abu Dhabi stock exchanges.

Table 3: The Relation between Oil Price Shocks and Conditional Volatility

	S. Arabia	UAE	Kuwait	Qatar	Bahrain	Oman
Mean Equation						
β_0	-0.0002	-0.0002	0.0003**	0.0001	-0.0003	0.0002
	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
β_1	-0.1119	0.1448***	0.0857*	0.1308***	0.0360	0.1978***
	(0.0407)	(0.0541)	(0.0464)	(0.0372)	(0.0395)	(0.0642)
Volatility Equation						
δ_0	$3.1*10^{-5}$***	$2.7*10^{-6}$	$1.6*10^{-7}$	$2.9*10^{-6}$***	$5.2*10^{-7}$	$9.4*10^{-8}$
	($3.4*10^{-6}$)	($2.1*10^{-6}$)	($1.3*10^{-6}$)	($5.3*10^{-7}$)	($1.2*10^{-6}$)	($1.6*10^{-6}$)
δ_1	0.2297***	0.2559***	0.1741***	0.22285***	0.0745***	0.2768***
	(0.0234)	(0.0485)	(0.0428)	(0.0490)	(0.0277)	(0.0658)
δ_2	0.5436***	0.7058***	0.7295***	0.7791***	0.7921***	0.6549***
	(0.0209)	(0.0356)	(0.0591)	(0.0290)	(0.0769)	(0.0472)
δ_3 (trading volume)	$9.3*10^{-5}$***	$9.2*10^{-6}$***	$8.1*10^{-6}$***	$2.1*10^{-5}$***	$2.1*10^{-6}$*	$9.2*10^{-6}$*
	($9.6*10^{-6}$)	($3.4*10^{-6}$)	($2.4*10^{-6}$)	($1.7*10^{-6}$)	($1.1*10^{-6}$)	($5.5*10^{-6}$)
δ_4 (+ oil shock)	-0.00104***	0.00042***	0.00031*	0.00042***	0.00028*	0.00023
	($8.9*10^{-5}$)	(0.00012)	(0.00017)	($5.3*10^{-5}$)	(0.00016)	(0.00022)
δ_5 (- oil shock)	0.00129***	0.00054***	0.00033**	0.00057***	0.00030**	0.00083***
	(0.00037)	(0.00013)	(0.00014)	($1.6*10^{-5}$)	(0.00013)	(0.00028)
Log likelihood	2538.59	2772.31	3012.53	2631.43	3155.46	2877.04

Note: The numbers in parentheses are the standard errors. All estimations are done using the Bollerslev-Wooldridge heteroskedasticity consistent standard errors. ***, ** and * represent significance at the 1%, 5%, and 10% levels, respectively.

Table 4: Multi-factor Model Results for Portfolios Formed on *Size* and *Book-To-Market Ratio*

Portfolios formed on size and book-to-market ratio					
γ_0	γ_M	γ_{SMB}	γ_{HML}	γ_{IV}	R^2
Saudi Arabia					
2.649	-1.814	0.036	-1.675**	0.206	0.644
(1.33)	(-0.91)	(0.05)	(-2.11)	(0.19)	
UAE					
1.637	-0.342	-0.707	-3.040***	-1.955*	0.523
(0.82)	(-0.26)	(-1.36)	(-3.34)	(-2.11)	
Kuwait					
2.890	-2.474*	0.733	-3.725**	-2.157**	0.557
(1.53)	(-1.75)	(1.16)	(-2.44)	(-2.47)	
GCC-wide					
1.312	-0.633	0.278	-0.350	-1.124	0.677
(1.35)	(-0.38)	(0.40)	(-0.63)	(-1.18)	

Note: This table reports the Fama-MacBeth (1973) cross-sectional regression coefficients for nine portfolios sorted by first firm size and then by book-to-market ratios. The coefficients are obtained using monthly data during April 2006 through March 2013. M represents the monthly excess market return; SMB and HML are size and book-to-market factors; and IV is the idiosyncratic volatility factor. The Newey and West (1987) t-statistics are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level.

Table 5: Multi-factor Model Results for Portfolios Formed on *Size* and *Idiosyncratic Volatility*

Portfolios formed on size and idiosyncratic volatility					
γ_0	γ_M	γ_{SMB}	γ_{HML}	γ_{IV}	R^2
Saudi Arabia					
1.539	-0.955	0.661	0.947	2.908*	0.546
(1.16)	(-0.64)	(0.62)	(0.81)	(2.04)	
UAE					
0.869	-0.579	-0.908*	-0.489	0.759	0.556
(0.50)	(-0.53)	(-1.76)	(-0.60)	(0.85)	
Kuwait					
0.538	-0.773	-1.465*	0.955	-1.423	0.549
(0.51)	(-0.96)	(-1.73)	(0.72)	(-1.31)	
GCC-wide					
0.537	-0.340	-0.015	0.796	-0.957	0.714
(0.43)	(-0.33)	(-0.03)	(1.03)	(-0.83)	

Note: This table reports the Fama-MacBeth (1973) cross-sectional regression coefficients for nine portfolios sorted by first firm size and then by idiosyncratic volatility. The coefficients are obtained using monthly data during April 2006 through March 2013. M represents the monthly excess market return; SMB and HML are size and book-to-market factors; and IV is the idiosyncratic volatility factor. The Newey and West (1987) t-statistics are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level.

Table 6: Exposure to Oil Price and Stock Returns

	Panel A: Portfolios sorted by oil exposure			Panel B: Portfolios sorted by absolute oil exposure		
Portfolio Ranks	β_O	**Return**	**Std. dev.**	β_O	**Return**	**Std. dev.**
	Saudi Arabia					
1	-0.443	2.647	19.968	0.062	-0.254	12.759
2	-0.013	-0.732	12.942	0.209	0.322	14.823
3	0.455	2.132	17.074	0.722	3.919	21.612
3-1		**-0.515**			**4.173*****	
		(0.354)			**(0.000)**	
	UAE					
1	-0.396	1.066	17.779	0.059	0.214	13.801
2	0.011	-0.072	13.346	0.207	-0.272	13.182
3	0.406	0.588	15.37	0.618	1.630	19.041
3-1		**-0.478**			**1.416****	
		(0.396)			**(0.013)**	
	Kuwait					
1	-0.396	0.018	14.834	0.059	-0.361	12.037
2	0.007	-0.303	12.071	0.220	-0.427	13.208
3	0.415	1.113	18.061	0.594	1.622	19.251
3-1		**1.095*****			**1.983*****	
		(0.007)			**(0.000)**	
	GCC-wide					
1	-0.385	0.922	19.087	0.038	-0.314	11.755
2	0.001	-0.384	12.001	0.143	-0.099	12.650
3	0.279	0.602	15.252	0.533	1.556	21.015
3-1		**-0.320**			**1.870*****	
		(0.218)			**(0.000)**	

Note: This table reports the average returns during the January 2006 through March 2013 period for three portfolios sorted by oil price risk loadings. Stocks are first ranked into terciles based on oil price risk loadings estimated using Equation 5: $R_{i,t} = \beta_0 + \beta_{i,RM} R_{m,t} + \beta_{i,O} R_{o,t} + \varepsilon_{i,t}$, where $R_{i,t}$ and $R_{m,t}$ are the excess return for stock *i* and the market index for day *t*, respectively, $R_{o,t}$ is the oil return for day *t*, and $\beta_{i,O}$ is the loading on the oil factor for stock *i* during that month. Next, equally-weighted portfolios are constructed using stocks in each tercile from the lowest (Tercile 1) to the highest (Tercile 3) based on oil factor loadings (Panel A) and on the absolute value of oil factor loadings (Panel B). The row "3-1" represents the difference in monthly returns between Portfolio 3 and Portfolio 1 (t-statistic reported in parentheses). *, **, and *** denote statistical significance at 10%, 5%, and 1% level.

Table 7: Price of Oil Exposure

Model	γ_0	γ_M	γ_{SMB}	γ_{HML}	γ_{IV}	γ_O	R^2
	Saudi Arabia						
CAPM+Oil	-1.890*	1.762*				1.316	0.312
	(-1.85)	(1.84)				(1.12)	
FF+IV+Oil	0.125	0.052	1.572	1.379	-0.909	0.784	0.603
	(0.07)	(0.04)	(1.03)	(0.02)	(-1.30)	(0.45)	
	UAE						
CAPM+Oil	-0.756	0.368				1.269	0.331
	(-1.13)	(0.35)				(0.84)	
FF+IV+Oil	-1.267	0.838	-1.300	0.933	-1.063	2.489	0.592
	(-0.83)	(0.80)	(-1.20)	(0.69)	(-0.97)	(1.37)	
	Kuwait						
CAPM+Oil	-2.378***	1.671**				-0.019	0.356
	(-2.78)	(2.09)				(-0.01)	
FF+IV+Oil	-2.348**	1.426	0.902	1.391	2.081	-1.911	0.692
	(-1.92)	(1.42)	(0.67)	(0.89)	(1.10)	(-0.91)	
	GCC-wide						
CAPM+Oil	-0.287	0.376				2.029	0.455
	(-0.45)	(0.37)				(1.04)	
FF+IV+Oil	-0.849	1.334	0.065	0.794	2.131**	2.025	0.743
	(-1.15)	(1.04)	(0.07)	(1.38)	(2.50)	(0.93)	

Note: This table reports the Fama- MacBeth (1973) cross-sectional regression coefficients for nine portfolios sorted by first market and then by oil exposures. The coefficients are obtained using monthly data during April 2006 through March 2013. M represents the monthly excess market return; SMB, HML, IV and O are size, book-to-market, idiosyncratic volatility and oil factors, respectively. The Newey and West (1987) t-statistics are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level.

Table 8: Price of Oil Exposure (Absolute)

Model	γ_0	γ_M	γ_{SMB}	γ_{HML}	γ_{IV}	γ_O	R^2
	Saudi Arabia						
CAPM+Oil	-2.855***	1.996				1.335	0.338
	(-2.91)	(1.32)				(0.69)	
FF+IV+Oil	-1.481	0.615	2.039*	-1.221	0.935	-1.416	0.652
	(-1.26)	(0.51)	(2.20)	(-0.81)	(1.02)	(-0.53)	
	UAE						
CAPM+Oil	-1.405	0.303				5.963***	0.306
	(-1.64)	(0.29)				(3.08)	
FF+IV+Oil	-1.928	0.917	0.143	0.022	0.806	1.787	0.586
	(-1.33)	(1.03)	(0.17)	(0.04)	(0.85)	(0.92)	
	Kuwait						
CAPM+Oil	-2.879***	1.385**				6.200*	0.385
	(-4.08)	(2.26)				(1.98)	
FF+IV+Oil	-4.018***	2.722*	-1.455	6.805*	4.124*	-0.403	0.688
	(-2.98)	(2.04)	(-0.82)	(1.66)	(1.82)	(-0.16)	
	GCC-wide						
CAPM+Oil	-0.277	0.357				1.945	0.494
	(-0.39)	(0.34)				(1.05)	
FF+IV+Oil	-0.440	-0.721	1.537**	-0.738	4.982***	2.753	0.769
	(-0.52)	(-0.63)	(2.55)	(-0.83)	(2.92)	(1.41)	

Note: This table reports the Fama-MacBeth (1973) cross-sectional regression coefficients for nine portfolios sorted by first market and then by *absolute* oil exposures. The coefficients are obtained using monthly data during April 2006 through March 2013. M represents the monthly excess market return; SMB, HML, IV and O are size, book-to-market, idiosyncratic volatility and oil factors, respectively. The Newey and West (1987) t-statistics are reported in parentheses. *, **, and *** denote statistical significance at 10%, 5%, and 1% level.

Table 9: Subsequent Returns for Portfolios Sorted on Absolute Oil Exposure

Level of exposure	**Average exposure (β_O)**	**Subsequent returns**		
		1-month	**2-months**	**3-months**
Saudi Arabia				
High	0.722	1.978%	3.951%	5.255%
Low	0.062	0.871%	1.978%	3.133%
Spread (High-Low)		**1.107%****	**1.973%****	**2.122%****
		(0.032)	**(0.019)**	**(0.028)**
UAE				
High	0.618	0.626%	1.192%	2.108%
Low	0.059	0.006%	0.868%	1.843%
Spread (High-Low)		**0.620%**	**0.324%**	**0.265%**
		(0.226)	**(0.666)**	**(0.784)**
Kuwait				
High	0.594	0.261%	0.679%	1.403%
Low	0.059	0.478%	1.190%	1.653%
Spread (High-Low)		**-0.217%**	**-0.512%**	**-0.249%**
		(0.579)	**(0.371)**	**(0.729)**
GCC-wide				
High	0.533	0.596%	1.196%	1.446%
Low	0.038	-0.123%	0.184%	0.859%
Spread (High-Low)		**0.719%*****	**1.012%*****	**0.587%**
		(0.002)	**(0.003)**	**(0.167)**

Note: Each month from January 2006 through March 2013, stocks are assigned to one of two portfolios (high/low exposure) based on their sensitivity to oil price using Equation 5: $R_{i,t} = \beta_0 + \beta_{i,RM} R_{m,t} + \beta_{i,O} R_{o,t} + \varepsilon_{i,t}$. Subsequent monthly returns are then calculated as average returns for portfolios sorted on the absolute value of oil exposures. The spread represents the difference in monthly subsequent returns between the high and low exposure portfolios (t-statistic reported in parentheses). *, **, and *** denote statistical significance at 10%, 5%, and 1% level.