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Oil Price Changes and Stock Market Performance in UAE: Evidence of Cointegration Persists in Economic Diversification era

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ABSTRACT

The aim of this paper is to examine the linkages between stock market index, Dubai Fateh oil spot price, interest rate and FDI using monthly data on Abu Dhabi stock index for the period 2006-2019. Vector Autoregressive Model have been employed to analyse the relationship between the variables. Using monthly data from 2006 to 2019, the results of Vector Error Correction Model (VECM) estimates suggest that there is long-run integration between oil price and monthly stock index series in which monthly oil prices have a positive impact on stock index. The Granger Causality indicates significant bidirectional causality running from ADX index, oil price and EIBOR. Meanwhile there is unidirectional causality from stock market index to FDI. Furthermore, Impulse Response Function has been employed to examine market response to oil price shocks and our study reveals that UAE stock market is efficient as it responds immediately to the oil shock. These findings are relevant for investors for portfolio management and for the policymakers such that more aggressive economic diversification policies maybe initiated to wane the significant persistent oil-stock integration.

Keywords: ADX Index, Oil Price, Interest Rate, Stock Market Index, United Arab Emirates
JEL Classifications: C30, C40, E44, E52

1. INTRODUCTION

Stock market represents a volatile environment and provides the investors with either positive or negative signs on the stock market returns (Eldomiaty, 2019). Stock market performance in all GCC countries have witnessed fluctuations in the past two decades in response to various macroeconomic events and has been declining since 2015. The year 2018 witnessed a decline in the stock markets globally as evidenced by fall in both MSCI World Index (10.4%) and MSCI Emerging Market (16.6%) in 2018 year-end. It is noteworthy that the Abu Dhabi index increased by 10.7% higher than 2017 but its total traded volume declined by 26%. Whereas the Dubai Financial Market Index and traded volume dropped by 25.8% and 48% respectively (zawya.com, 2019). Global economic slowdown, slump in oil prices, and weak performances in its real estate and retail market sectors are some of the factors that have caused the slump in the stock markets.

For OPEC countries, oil is of primary importance for its foreign exchange earnings and government spending, both of which determines the aggregate demand (Andersen and Bollerslev, 1998). GCC stock markets could be more susceptible to changes due to oil price fluctuations because these countries are major suppliers of oil in the present global energy markets (Arouri et al., 2011). Conversely, it has been argued that oil prices affect the stock market more significantly in oil-importing countries relative to oil exporters (Asteriou et al., 2013). This has spurred several studies on causal relationship between stock market and oil prices (Basher et al., 2018; Antonakakis, 2017; Boldanov, 2016; Maghyereh and Awartani, 2016; Wang et al., 2013) wherein long term relationship has been established between the two (Chittedi, 2012). There also exists argument in favour of weak dependence between oil prices and stock index except for US and Canada that are large oil producing countries (Sukcharoen et al., 2014).

It has been established that foreign direct investment (FDI) supports the diversification program in UAE, Qatar and Saudi Arabia (Medhioub, 2016), with a positive impact of sectoral FDI on sectoral GDP during the period 2008-2013. There was a steady growth in net FDI flows into UAE from 2006 to 2008. During 2010-2014, FDI inflows to UAE attained an average growth rate of 16.4%. Interestingly, during this period the UAE stock market index touched a high of AED 5,253.41 in May 2014 from a low of 2,255 in January 2009. FDI is regarded as an international inter-firm cooperation with real equity stake in foreign enterprises (De Mello, 1999) and motivated by high returns. Recipient countries are expected to benefit from technological transfers, new skill acquisition from technologically advanced countries. Sbia and Alrousan (2016) found evidence of long- term relationship between FDI, economic growth and financial development and concluded that FDI stimulates economic growth in UAE. Ho and Odhiambo (2018) also argued that there are several macroeconomic and institutional factors that affect the FDI influence on stock markets. However, existing literature cannot agree on whether FDI has a positive or negative effect on the development of the domestic stock markets.

Emirates Interbank Offered Rate (EIBOR) as the benchmark rate for spreads for individual commercial banks, which in turn, is strongly governed by movements of the Federal Reserve (Fed) of the USA and other strong currencies. EIBOR had reached its record-high levels in 2006-07 after which there was a drastic decline from 5.6% in mid-2006 to 1.9% by mid-2008 following the lowering of Fed rates in response to the 2008 global financial crisis. Although EIBOR was at its lowest in 2014-15 but it has witnessed a gradual increase during 2016-2017 responding to rate hikes in the US. Alam and Uddin (2009) in their multi-country study argues that interest rate had significant negative relationship with share price.

In the backdrop of such policy reforms, both fiscal and monetary, along with augmented FDI inflows, it becomes relevant and imperative to investigate the influence, if any, of oil prices and relevant macroeconomic factors on the performance of its stock market. The present study contributes to the extant literature by investigating the causal relationship between stock market performance and oil prices during the intensive diversification period 2006-2019.

The rest of the paper is structured as follows. The following section presents a review of the existing literature on related studies. The research methodology has been described in Section 3 and the analysis has been presented in Section 4. Section 5 highlights the discussion and implications of the research. Our main conclusions are highlighted in the Section 6 along with directions for future research.

2. LITERATURE REVIEW

Some of the earliest studies have shown that oil price changes are critical in explaining stock returns in relation to the US market (Jones and Kaul, 1996; Sadorsky, 1999; Papapetrou, 2001). Various aspects of the relationship between stock market and oil prices have been explored by extant literature. In a notable contribution, Park and Ratti (2008) examined a panel dataset of the US and 13 countries. The authors concluded that oil price changes negatively affect stock market returns. Chang et al. (2010) likewise reported negative conditional correlation association between S and P 500, Dow Jones, NYSE, FTSE100, and Brent prices. Negative relationship between Brent, WTI, and S&P500 was also reported by Choi and Hammoudeh (2010).

Lu et al. (2017) showed a bidirectional causality between S&P500 and WTI between crude oil prices in WTI and S&P500 index. The author found negative and positive effects stemming from the WTI to S&P500 in some subperiods. Using the structural VAR approach (SVAR) Gupta and Modise (2013) examined the relationship between oil price shocks and the stock market returns in South Africa. The study evidenced that stock returns and the real price of oil move in opposite directions in response to speculative demand shocks and oil supply shocks. Conversely, using SVAR model Effiong (2014) revealed that in Nigeria the response of stock market to the aggregate demand and oil-specific shocks was positive.

In studies on emerging markets, Yadav et al. (2020) found evidence of positive short run impact of crude oil prices on the Indian Sensex and an insignificant long run relationship. Ravichandran and Alkathlan (2010) provided evidence of long run integration between oil price and GCC stock returns. This finding is consistent with Mohd et al. (2022) for 14 countries during the covid-19 period. The authors reported bidirectional causality between stock returns and oil price for both oil exporting and oil importing countries. The direct causality was contradicted by Hamoudeh and Choi (2006) for GCC using the VEC model and later confirmed a weak association between oil prices and stock market. (Akoum et al., 2012) confirmed co-movement of oil prices and stock returns in the long run in GCC countries. The authors also argued that the dependence is not found in the short run. Positive stock-oil relationship was also reported by Mokni (2020) for all oil exporting countries except for Norwegia whereas Le and Disegna (2021) argued that for South Asian markets, a country's status in the oil market was a critical factor for effect of oil demand shock on the stock market. The authors noted that the stock markets exhibit different responses to oil supply shock and oil demand shock depending on its status as oil refinery, oil exporting or oil importing country.

There are opposing views in the existing literature on the effect of FDI on stock market development. Claessens et al. (2001) stated out that countries with stable economic fundamentals tends to have a high inflow of FDI, which boosts financial institutions. Positive impact of FDI on Nepal stock market was reported in a recent study (Chettri et al., 2022) with short run unidirectional causality from FDI to stock but a bidirectional causality in the long run with negative sign. In line with this argument, studies from the Pakistani stock market confirmed the positive impact of FDI (Malik and Amjad, 2013; Raza et al., 2012). In complete contrast, Fernández-Arias and Hausmann (2001) concludes that countries that are riskier, financially underdeveloped and institutionally weaker have a higher inflow of FDI, showing a negative correlation with the development of stock markets.

Alam and Uddin (2009) studied empirical relationship between stock index and interest rate for fifteen developed and developing countries and found significant negative relationship between interest rate and share price for all the countries (Hsing, 2004). Maysami and Koh (2000) investigated the fluctuations in the Singapore stock index over a 7 year period and observed negative association between stock returns with changes in short- and long-term interest rates while Rahman et al. (2009) showed that monetary policy variables have considerable long-term effects on the Malaysian stock exchange. Osei-Fosu and Osei-Fosu (2013) found a positive relationship between interest rate and stock index. These studies ignored the relationship between FDI and interest rate.

Past studies on UAE stock market-oil nexus has been conducted prior to these structural changes in UAE financial landscape. Therefore, our study makes important contributions to the existing literature on UAE stock market and contradicts past studies in the region. To this end, we examine the influence of net FDI flows on the stock indices. We consider the effect of structural changes and monetary policy environment by adding interest rate in the nexus.

3. RESEARCH METHODOLOGY AND RESULTS

Following Sadorsky (1999) and Papapetrou (2001), to examine the relationship between oil price and stock market we use monthly data. Dubai Fateh crude oil spot price per barrel in USD has been taken from the World Bank Commodity Price database. Data on monthly stock market index is from the websites of Abu Dhabi Stock Exchange, company annual reports, official publications and press releases. Macroeconomic data was collected from the official data sources. The monetary policy decision variable has been proxied by the Emirates Interbank Offered Rate (EIBOR) taken from the month-end 3-month short term interest rate released by the UAE Central Bank. Data on FDI was obtained from the Census and Economic Information Center website. Following Sbia and Alrousan (2016), we use logarithm of FDI inflows over GDP. Our monthly data spans from 2006 to 2019.

3.1. Model Specification with Stationarity

The vector autoregression (VAR) model involves '*k*' time series regressions, where the lagged values of all '*k*' series appear as regressors. Therefore, for a lag order of 'P' the *VAR(p)* model of two variables (*k*=2) Xt and Yt, the model is given by the equations

$$Yt = \alpha 10 + \alpha 11.Yt-1 + ... + \alpha 1p.Yt-p + \beta 11.Xt-1 + ... + \beta 1p.Xt-p + u1t$$

$$Xt = \alpha 20 + \alpha 21.Yt-1 + ...+ \alpha\ 2p.Yt-p + \beta 21.Xt-1 + ... + \beta 2p.Xt-p + u2t \quad (1)$$

Therefore, the time series model with our 5-variable (*k = 5*) case transforms into

$$ADXt = f(\sum ADXt-n, \sum OILt-n, \sum EIBORt-n, \sum FDIt-n)$$

$$OILt = f(\sum ADXt-n, \sum OILt-n, \sum EIBORt-n, \sum FDIt-n)$$

$$EIBORt = f(\sum ADXt-n, \sum OILt-n, \sum EIBORt-n, \sum FDIt-n)$$

$$FDIt = f(\sum ADXt-n, \sum OILt-n, \sum EIBORt-n, \sum FDIt-n)$$

In order to estimate any time series coefficient, we first need to test for stationarity of each series, since non-stationary data leads to spurious regression (Dimitrova, 2005). Stationarity in the series, at levels and at first-differences, is investigated using the augmented Dickey and Fuller (ADF) test. Table 1 shows that the results of the ADF at the original level with intercept and trend, where we infer that the data contains unit roots and is non-stationary. The ADF test on the first-order difference confirms stationarity of the series and fulfils the requirement for carrying out the time series modelling.

3.2. Diagnostic Tests for Time Series Analysis

The first objective of the multivariate time series model is to determine optimal lag intervals through tests of null hypotheses that all coefficients at a given lag equal zero. Model selection criteria requires the explicit choice of lag length in the equations of the model. If one chooses too many lags there would be loss of degrees of freedom while too few lags would lead to specification errors. Following Judge et al. (1988) and Mc Millin (1988), Akaike's AIC criterion and the Likelihood Ratio (LR) are used to determine the lag length of the multivariate time series model. Our results show that optimal value would be a lag of order 2 (Table 2). Diagnostic checks confirm that there is no autocorrelation of the residuals at lag 2, through the Lagrange-multiplier test (Table 3). We also check the stability condition of the dataset. Since the modulus of each eigenvalue is strictly <1, the estimates satisfy the eigenvalue stability condition (Table 4). The eigenvalues with the real components on the x axis and the complex components on the y axis is also displayed in Figure 1 which indicate visually that these eigenvalues are inside the unit circle.

We have determined that each variable of the 4-equation (*k = 4*) time series model is stationary at first difference, I(1), and the equations are optimal at lags of order 2 (P = *2*). This implies that either Vector Autoregressive (VAR) model or Vector Error

Table 1: Result of augmented dickey fuller (ADF) stationarity test

Variables	Level	1st difference
ADX	−1.229 (0.6608)	−10.813*** (0.0000)
Oil	−1.748 (0.4067)	−8.517*** (0.0000)
EIBOR	−1.769 (0.3960)	−6.699*** (0.0000)
FDI	−0.524 (0.8873)	−3.665*** (0.0046)

Figures in parentheses indicate the *P* values. *** indicates significance at 99% level of confidence. Ho=Variable has a unit root

Table 2: Result of selection-order criteria: Likelihood ratio test

Lag	LR	df	p	FPE	AIC	HQIC	SBIC
0				4.1e−06	−1.05082	−1.02013	−0.975215
1	2245.2	16	0.000	5.7e−12	−14.5461	−14.3926	−14.1681
2	341.24	16	0.000	8.6e−13*	−16.4317*	−16.1555*	−15.7513*
3	30.267	16	0.017	8.7e−13	−16.4212	−16.0221	−15.4383
4	21.387	16	0.164	9.3e−13	−16.3564	−15.8347	−15.0711

Endogenous: ADX OIL. EIBOR FDI Exogenous: Constant

Table 3: Result of lagrange multiplier test

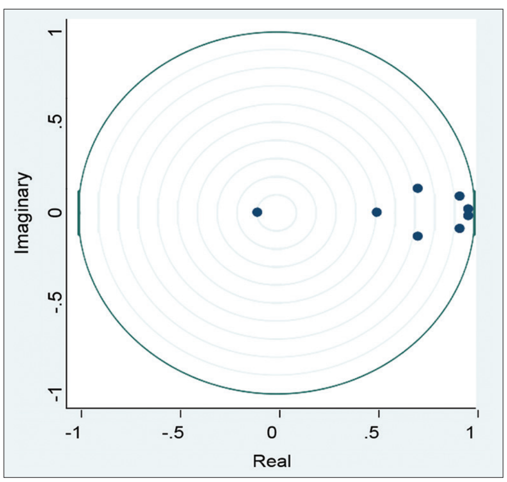
Lag	Chi-square	DF	Prob > Chi-square
1	27.9150	16	0.03237
2	17.2915	16	0.36698

H0: No autocorrelation at lag order

Table 4: Result of eigenvalue stability condition test

Eigenvalue		Modulus
0.9657088	+0.01869971i	0.96589
0.9657088	−0.01869971i	0.96589
0.9227856	+0.08937862i	0.927104
0.9227856	−0.08937862i	0.927104
0.7115304	+0.1324209i	0.723748
0.7115304	−0.1324209i	0.723748
0.5047719		0.504772
−0.09763307		0.097633

Figure 1: Roots of the companion matrix for stability condition



Correction Model (VECM) can be fit to the first difference of the variables in the time series dataset. In order to choose the appropriate model, we need to establish if the time series is cointegrated (Johansen, 1988). If there exists cointegration in the series, fitting the VAR model to the first difference of the variables may lead to misspecification of the model and the VECM will be appropriate which captures both the short run and long run relationship between the variables. Johansen's "trace" statistic method is used to identify the number of cointegrating equations, by solving for the rank of the model based on the Johansen's maximum likelihood (ML) estimator.

The output in Table 5 shows the results that the trace statistics at "r=1" of 25.9810 is less than the critical value of 29.68, thus confirming the presence of long term cointegrating relationship between the variables. Hence the VECM is chosen to be appropriate for modeling the time series association.

All the eigenvalues lie inside the unit circle. VAR satisfies stability condition.

3.3. Vector Error Correction Model

The cointegration results confirm a long run cointegration relationship between the variables and we proceed to estimate the Vector Errors Correction Model (VECM). The full output of the VECM has been included in Appendix 1 while Table 6 gives the summary of the results.

The long run equilibrium condition is established where only oil prices have a significant (at 99% confidence level) positive relation with the ADX stock index price such that a 1% increase in the oil price in the UAE results in a 0.88% rise in the stock index, thereby confirming a positive long-term linkage between oil and stock index in the UAE. In the short run, however, oil prices show a weak significance but still confirms the positive relation with stock prices. The positive relationship maybe attributed to UAE's position as oil exporter and one of the major players in OPEC.

Consistent with our result, a strand of literature has established that an increase in oil price has positive impact on oil exporting countries. The authors believe that oil-exporting countries benefit from higher export revenues, which could be diminished by a decline in a global oil demand (Park and Ratti, 2008; Bjornland, 2009, Wang et al., 2013, Arouri and Rault, 2012). An array of studies have also found that for the Gulf Arab stock markets higher oil prices lead to higher stock values (Mohanty et al., 2011; Demirer et al., 2015). However, for Russia, one of the largest exporter of oil, a permanent negative correlation was found between oil market in Russia and stock market (Bhar and Nikolova, 2010). Whereas limited impact of oil supply shock on stock market was reported by Le and Disegna (2021).

The results in Table 6 also shows a strong negative effect of interest rate on UAE stock market but only in the short run. Our finding is consistent with the argument that investors do not understand that equity earnings provide a hedge against inflation and incorrectly reduce the market values of equities when expectations of inflation hence interest rates) rise (Modigliani and Cohn, 1979). In contrast, studies have also confirmed a positive effect of interest rate on stock market (Eldomiaty et al., 2018; Nissim and Penman, 2003; Amata et al., 2016)

Table 5: Result of johansen test for cointegration

Maximu rank	Parameters	Lag length	Eigenvalue	Trace statistic	5% critical value
0	20	1372.8		47.3369	47.21
1	27	1383.5	0.12072	25.9810*	29.68
2	32	1392.2	0.09952	8.5794	15.41
3	35	1395.4	0.03847	2.0666	3.76
4	36	1396.5	0.01236		
Trend: Constant			Number of obs=66		1
Sample: 2006 m3–2019 m12			Lags=2		2

3.4. Granger Causality

A variable "*x*" is said to Granger-cause a variable "*y*" if past values of "*x*" are useful for predicting "*y*." A common method for testing Granger causality is to regress "*y*" on its own lagged values and on lagged values of "*x*" and test the null hypothesis that the estimated coefficients on the lagged values of "*x*" are jointly zero. Failure to reject the null hypothesis is equivalent to failing to reject the hypothesis that "*x*" does not Granger-cause "*y*." For each equation, Granger Causality tests the hypotheses that each of the other endogenous variables does not Granger-cause the dependent variable in that equation (Granger, 1969).

According to Table 7 (full output in Appendix 2), stock price, oil price and EIBOR are related in a bi-directional association. The bidirectional relationship between oil and stock market is consistent with other regional studies for Saudi and Omani stock market (Hammoudeh and Eleisa, 2004; Basher and Sadorsky, 2006, Awartani and Maghyereh, 2013) and also with results from a panel of OECD and non-OECD countries (Zhu et al., 2011). Recent studies also confirmed the bidirectional causality with the argument that there was an increased interdependence between oil and stock price changes the oil price crash (Mohd et al., 2022). Contrary to our result, unidirectional relationship between oil and stock was reported for the Indian stock market where only oil prices influences the stock index but the Sensex has no impact on the oil price movement (Yadav et al., 2020). Past studies have observed high level of integration and correlation between stock market and commodities market, particularly for oil futures, in post 2000 era (Buyuksahin et al., 2010, Silvennoinen and Thorp, 2013; Daskalaki and Skiadopolous, 2011; Cheung and Miu, 2010).

Our results on FDI and stock prices confirm a unidirectional causality with a positive sign. This finding is consistent with Chettri, (2022).

3.5. Impulse Response Function

Impulse response functions (IRF) have been used to estimate the response of oil price shock to a specific variable (Cong and Shen, 2013; Degiannakis et al., 2014; Papapetrou, 2001). IRF involves a vector moving. Average (VMA) that traces out the time path of the various shocks on the variables contained in the time series equation system. Figure 2 shows that we have used the IRFs to map out the dynamic response path of variables (stock price, FDI and EIBOR) due to a one-period standard deviation shock to oil price.

The response of ADX index to oil price shock was small. This is not surprising considering the share of Oil GDP has been declining

Table 6: Result of vector error correction model

Variables	Coefficient
Long run coefficients	
ADX	1
Oil	0.88198***
Eibor	−0.0277548
FDI	−0.2147686
Constant	−4.3153
Short run coefficients	
ADX	0.0846
Oil	0.0926*
Eibor	−0.0318***
FDI	0.11723
Constant	−0.00035

***Significant at 99% level of confidence. **Significant at 95% level of confidence. *Significant at 90% level of confidence

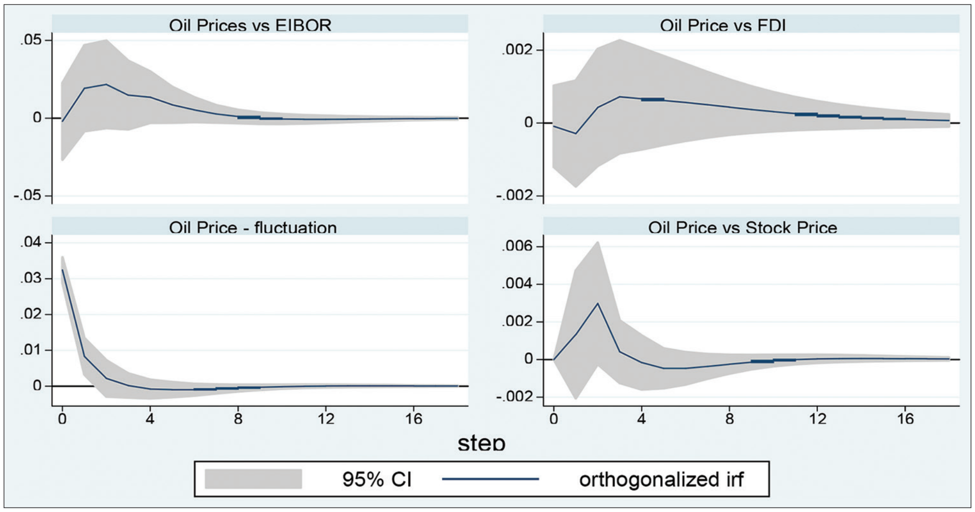
Table 7: Result of granger causality wald test

Equation	Excluded	Chi-square	???		
ADX	Oil	5.6192*	Oil	granger causes	ADX
	EIBOR	18.485***	EIBOR	granger causes	ADX
Oil	ADXE	11.797***	ADX	granger causes	OIL
	IBOR	6.6595**	EIBOR	granger causes	OIL
EIBOR	ADX	14.229***	ADX	granger causes	EIBOR
	Oil	7.8544**	Oil	granger causes	EIBOR
FDI	ADX	10.385***	ADX	granger causes	FDI
	EIBOR	4.8119*	EIBOR	granger causes	FDI

***Significant at 99% level of confidence. **Significant at 95% level of confidence. *Significant at 90% level of confidence

over the last decades from around 50-60% in1990's to 30% in 2018 since UAE has successfully diversified its economy and reduced its reliance on oil. It has been argued that the magnitude of stock market responses to oil price shocks is higher for the newly established and/or less liquid stock markets (Fillis and Chatziantoniou, 2014). The Impulse Response Function also shows that the reaction of ADX index to the oil shock was quick; there was an immediate sharp response which reached a peak in the 2nd month. This result suggests that UAE stock market is efficient in responding to new information contradicting the previous findings on the market inefficiency in the UAE by Fayyad and Daly (2011). However, our results also confirm that the effect tapered off from the 3rd month and exhibited prolonged response where it took almost a year for the stock market index to stabilize to its

Figure 2: Impulse response functions to oil price shocks



pre-shock levels. The lagged effect of oil price on stock market activity in the UAE is consistent with a study on Korean markets by Masih et al. (2011) and Mohd et al. (2022).

4. CONCLUSION AND IMPLICATIONS

The UAE stock market has been responding to repercussions from global macroeconomic events, volatility within the GCC region as well as drastic structural reforms within the country, during the last decade. The stock index of the Abu Dhabi Securities Exchange showed some growth following the financial crisis of 2008 but has been declining since 2015. This can be attributed to a global economic slowdown, uncertainties of Brexit, slump in worldwide oil prices, weak performances in the UAE real estate and retail market sectors along with significant policy changes in favour of diversification of the economy. The present study investigates the influence of oil prices and other macroeconomic factors on the performance of the Abu Dhabi stock market index, during the period 2006-2019.

We find evidence of positive long-term linkage between oil and stock index, indicating that Abu Dhabi stock exchange has been vulnerable to oil price volatilities. Granger causality also confirmed bi-directional association between ADX index and oil price, confirming that ADX has predictive power for the Dubai crude oil prices and vice-versa. Stock price and FDI exhibited a unidirectional causality implying that stock market reforms and the ensuing improvements in the UAE capital market, helped to stimulate FDI inflows and, consequently, the Abu Dhabi Stock exchange has been a driver of economic growth through increased FDI inflows. From the Impulse Response functions, we can conclude that UAE stock market is efficient in reflecting the available information, contradicting the previous finding on inefficiency of UAE stock market due to its slow response to oil price shocks.

The findings have certain policy implications; the positive association implies that the stock market is highly interconnected with oil market. Thus, during periods of oil price slump, stock market index will also fall causing erosion in financial assets. The investors may use this information to revision in their portfolio. Further, the long run cointegration implies that despite economic diversification efforts by the policy makers to move away from oil dependency, fluctuations in oil prices continues to be consequential for the UAE stock market.

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APPENDIX

Appendix 1. Vector Error Correction Model

Vector error-correction model

Sample: 2006m3-2019m12		Number of obs =	166
		AIC =	-16.34316
Log likelihood =	1383.482	HQIC=	-16.1377
Det (Sigma_ml) =	6.78e-13	SBIC=	-15.83699

Equation	Parms	RMSE	R-sq	Chi-square	P>Chi-square
D_logStock	6	0.022883	0.1303	23.96241	0.0005
D_logOil	6	0.032986	0.2777	61.50583	0.0000
D_Eibor	6	0.162685	0.4052	109.0195	0.0000
D_logFDI	6	0.00749	0.7295	431.4235	0.0000

	Coef.	Std. Err.	Z	P>|z|	[95% Conf.	Interval]
D_logStock						
_ce1 L1.	−0.0030075	0.0116978	−0.26	0.797	−0.0259348	0.0199199
logStockLD.	0.0845947	0.0801315	1.06	0.291	−0.0724601	0.2416495
logOilLD.	0.0926356	0.0498185	1.86	0.063	−0.0050069	0.1902781
EiborLD.	−0.0318004	0.0089511	−3.55	0.000	−0.0493443	−0.0142565
logFDILD.	0.1172285	0.1292724	0.91	0.364	−0.1361408	0.3705978
_cons	−0.0003459	0.0018114	−0.19	0.849	−0.0038961	0.0032043
D_logOil						
_ce1 L1.	−0.0563485	0.0168622	−3.34	0.001	−0.0893978	−0.0232993
logStock LD.	0.3835076	0.1155077	3.32	0.001	0.1571167	0.6098985
logOil LD.	0.3053061	0.0718122	4.25	0.000	0.1645568	0.4460555
Eibor LD.	−0.0311285	0.0129028	−2.41	0.016	−0.0564176	−0.0058394
logFDI LD.	0.1509799	0.1863433	0.81	0.418	−0.2142461	0.516206
_cons	−0.0019687	0.002611	−0.75	0.451	−0.0070862	0.0031489
D_Eibor_ce1 L1.	0.254213	0.0831637	3.06	0.002	0.0912152	0.4172108
logStock LD.	−1.887961	0.5696802	−3.31	0.001	−3.004513	−0.7714081
logOil LD.	0.7607673	0.3541756	2.15	0.032	0.066596	1.454939
Eibor LD.	0.5469493	0.0636364	8.59	0.000	0.4222243	0.6716743
logFDI LD.	−0.7309902	0.9190389	−0.80	0.426	−2.532273	1.070293
_cons	−0.000445	0.0128775	−0.03	0.972	−0.0256845	0.0247945
D_log FDI						
_ce1 L1.	0.0050353	0.003829	1.32	0.188	−0.0024694	0.0125401
logStock LD.	0.0337647	0.0262293	1.29	0.198	−0.0176437	0.0851731
logOil LD.	−0.0111881	0.016307	−0.69	0.493	−0.0431492	0.0207729
Eibor LD.	0.0029211	0.00293	1.00	0.319	−0.0028215	0086637
logFDI LD.	0.8308139	0.0423144	19.63	0.000	0.7478791	0.9137487
_cons	0.0002299	0.0005929	0.39	0.698	−0.0009321	0.001392

Cointegrating equations

Equation	Parms	Chi-square	P>Chi-square
_ce1	3	19.89728	0.0002

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1 logStock logOil Eibor logFDI _cons	1	.		.	.	.
	0.8819	0.2	.	0.000	0.41	1.345201
	781	363425	3.73	0	87552	0.020
	-	0.0	-	0.257	-	2522
	0.0277548	244938	1.13	0	0.0757618	0.335
	-	0.2	-	0.444	-	4761
	0.2147686	807423	0.77	.	0.7650133	.
	-	.	.		.	
	4.315306					

Appendix 2: Output of the Granger Causality Wald test

Granger causality Wald tests

Equation	Excluded	Chi-square	df	Prob >Chi-square
logStock	logOil	5.6192	2	0.060
logStock	Eibor	18.485	2	0.000
logStock	logFDI	4.0393	2	0.133
logStock	ALL	25.21	6	0.000
logOil	logStock	11.797	2	0.003
logOil	Eibor	6.6595	2	0.036
logOil	logFDI	1.4085	2	0.494
logOil	ALL	25.052	6	0.000
Eibor	logStock	14.229	2	0.001
Eibor	logOil	7.8544	2	0.020
Eibor	logFDI	0.64908	2	0.723
Eibor	ALL	17.292	6	0.008
logFDI	logStock	10.385	2	0.006
logFDI	logOil	4.0081	2	0.135
logFDI	Eibor	4.8119	2	0.090
logFDI	ALL	12.498	6	0.052