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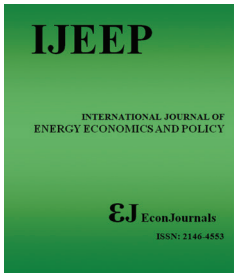

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Relationship between Oil and Stock Markets: Evidence from Pakistan Stock Exchange

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ABSTRACT

This study documents the impact of price variations in global markets, specifically oil, on stock returns at Pakistan stock exchange (PSX). We select three global markets (oil, gold and currency exchange) and two PSX indices (conventional and Islamic) for a period 2009-2020 to provide evidence. Monthly data for the selected time series is used for analysis. Analysis techniques include descriptive statistics, stationarity testing, Johansen cointegration, correlation and regression analysis. Findings suggest joint long-run co-movements of selected markets. Regression results indicate the significance of oil prices at 1% level, with positive signs, in the stock return generation process at PSX (for both indices conventional and Islamic). Other selected markets (gold and currency exchange) are although significant but at a higher degree, with negative signs. For the oil market, results confirm the demand-pull inflation hypothesis in Pakistani market. Results also confirm shifting to gold market by investors in the period of reductions in stock returns. Finally, depreciation of domestic currency discourages investors in buying stocks. We recommend investors to have an eye on oil, gold and currency markets while making investment decisions at PSX. We also recommend to policymakers to take timely actions for exchange rate stability, to avoid the outflow of capital. To the best of our knowledge, this is the only study documenting the influence of global markets on stock returns at PSX in recent years.

Keywords: Oil Prices, Gold Market, Exchange Rate, Stock Market, Pakistan
JEL Classifications: G10, G11, G12

1. INTRODUCTION

Oil consumption plays a significant role in modern economies from running production machinery to the transportation of agricultural goods as well as human resources engaged in the provision of services. Hence its consumption supports all sectors (agriculture, industry and services) contributing to gross domestic product (GDP) of the economy. In specific sectors, including agriculture and industry (utilising engine technologies) contribution by oil-consumption is direct, while in other areas (services) it contributes indirectly through transportation. At this point in time, managing an economy without oil-consumption is beyond imagination, although exploration in certain other energy resources (e.g., renewable energy sector) is at rising, yet the significance of oil is unquestionable, so far. Such a critical resource of modern economic settings carries significant implications for other sectors of the economy and any mismanagement in the supply chain leads to consequences for the whole economy. Demand-supply imbalances lead to oil price fluctuations—resulting in broader economic implications for the global economy. However, oil price shocks have different implications for net oil importing and exporting economies. A positive shock is fruitful for exporter (higher cash inflow) but not for the importer (higher cash outflow) and vice versa.

Measurement of oil price implications for an economy is essential to manage the resources better. One way to address the issue is to measure through stock market—representing the economic activity

in an economy. Although not all companies, especially, Small and medium enterprises (SMEs) are represented at a stock market, still the stock market is considered a good indicator of economic activities within a country (in the absence of any other more inclusive barometer). Theoretically, it is justified that response to oil price shocks is different for oil-exporting and oil-importing economies. Also, empirics support this assertion to an extent. Hence, we may expect a positive association of oil prices and the stock market in exporting economies due to higher cash flows to the oil sector and demand for stocks ([Alexander, 2017]; [Hussein et al., 2018]) and vice versa—negative association in oil and stock markets in net oil-importing economies due to rise in the cost of production (Chang et al., 2019). However, considering the oil market as an investment avenue, such association may be negative in the oil-exporting economy. Furthermore, the association between oil prices and the stock market in the importing economy may be positive based on demand-push inflation in oil prices, signalling higher economic activity—leading to extended demands for stocks. Hence, we cannot conclude about the direction of the relationship between stocks and oil market, unless to study a particular market.

The literature identifies association as well as independent movements between stock and oil markets. However, evidence supporting association of both markets (e.g., [Ewinga & Malik, 2016]; [Ammar and Mahmoud, 2020]; [Shabbir, 2019]; [Shirazi and Meibodi, 2020]) is far more than independence in movements ([Berna and Istemi, 2015]; [Chikezie et al., 2019]). Furthermore, in case of association between oil and the stock market, literature documents positive ([Roberto et al., 2017]; [Shirazi and Meibodi, 2020]) as well as negative ([Xanthi et al. 2016]; [Filis et al., 2011]) relationships. Literature has documented the association of oil and stocks in multiple regions; however, evidence from South Asia is lesser than the size of the community. We have some evidence from Indian market (for example [Priyanka and Kumar, 2020]; [Ankit et al., 2018]), but same lacks for other countries, hence a gap in the literature exists, which this study is expected to fill. We document the association of oil and stock markets in the second-largest market (Pakistan) in South Asia. Oil has a significant contribution to the domestic economy and consumes a major chunk of money spent on imports (at times close to 30%) (SBP, 2015). This research is conducted to document the impact of oil price shocks on stock return generation process at the Pakistan stock exchange (PSX) for a recent period, post-global-financial-crisis (2009-2020). Two other global markets (gold and currency) are used as control variables. Another uniqueness of this study includes documentation of volatility transmission from oil to stocks in comparative settings of Islamic and conventional indices. We document the association of oil and stocks for the latest 128 months sample period (2009-2020) through cointegration and regression techniques. Findings suggest the significance of oil market variations in stock return generation process at 1% level (for conventional as well as Islamic indices).

Rest of the study proceeds as following. A selected review of the literature is presented in section II, followed by the methodology in section III. The analysis is presented in section IV, while section V concludes the study.

2. LITERATURE REVIEW

Association of oil and stock markets is well-documented in the literature. Oil contributes to stock returns generation positively as well as negatively. Increase in oil price may lead to a rise in the cost of production, resulting in a lesser profit to investors—leading to a decrease in the stock market. Alternatively, the increase in oil prices may signal demand push hypothesis—leading to a belief of increased economic activities—and demand for stocks increases. For net oil-exporting countries, the relationship is expected to be positive based on the higher demand for energy stocks. Empirics have documented positive as well as a negative association of oil and stock markets. A brief review is presented hereunder.

To start with global markets in North America and the European region, literature provides evidence on the association of stocks and oil markets. Ewinga and Malik (2016) report substantial volatility spillover between oil and stock markets after considering structural breaks from the USA between 1996 and 2013. The negative association of oil and the stock market is reported by Xanthi et al. (2016) for USA market after examining the daily data from 1995 to 2014 through the application of generalised autoregressive conditional heteroskedasticity (GARCH). However, Positive association between oil and the stock market is documented by Hussein et al. (2018) for Canadian market (net oil exporter) after studying monthly data from 1986 to 2015 through the application of regression and VECM. Zhang et al. (2020) study electricity stocks in North America and Europe for 2009-2019 and document greater volatility spillover from oil to stocks than natural gas to the stock market. Authors further conclude that the relationship is stronger in Europe than North America during the review period. Filis et al. (2011) study six markets including three oil-exporting (Canada, Mexico, Brazil) and three oil-importing (USA, Germany, Netherlands). Results provide evidence of the negative effect of oil prices in all stock markets, except for the 2008 financial crisis. On the other hand, Roberto et al. (2017) report interesting findings from the Latin American markets. The authors study six markets (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) for a period 2000-2015, using monthly data through the application of panel data techniques. Results support the positive effect of oil prices on stock returns, irrespective whether a country is exporter or importer of oil. Chang et al. (2019) study association between three important financial markets (the USA, UK and China) and two global oil markets (WTI and Brent) for a more extended period of 1988-2016 by applying the BEKK model. Findings suggest that UK and USA financial markets have a negative association with oil in post-GFC (global financial crisis) period, while for china results are mixed. Horobet et al. (2019) study transmission of volatility between European Union financial sector and oil market for a period 2010-2018, by Auto-regressive distributed lag (ARDL) specifications. Findings reveal that financial sector stocks are exposed to oil price risk in the long run.

A vital oil-exporting region in the world is the Middle East. Certain studies have focused on documenting the association of oil and stocks in this region, especially GCC (gulf cooperation council) countries. Ammar and Mahmoud (2020) document results for Dubai market through the application of multivariate autoregressive conditional heteroscedasticity (MGARCH) model from 2010 to 2018. Findings reveal transmission of volatility

between oil and energy stocks market. Abdul (2020) documents long-run association of oil and stock market for an important oil-exporting country (Saudi Arabia) by examining data from 2000 to 2017 through the application of vector auto regression (VAR) methodology. Hani (2019) reports findings from the GCC region for a period of 2011-2017 through the application of exponential smooth transition (ESTR) model. In three countries (Saudi Arabia, Kuwait and Bahrain) negative fluctuations in oil prices depict larger impact on stock returns than positive fluctuations, while an asymmetrical relationship is documented for the Omani market. However, Shabbir (2019) reports that volatility in oil prices significantly impact the stock returns in all Gulf stock markets. The author examined data from 2008 to 2017 through the application of VAR model, impulse response function (IRF) and the Granger causality tests. Mohamed and Julien (2009) test linear and nonlinear short-run relationship between oil prices and stock markets in the GCC region by using weekly data for a period 2005-2008. Results provide partial support for the hypothesis. Qatar, UAE and Oman markets show a positive relationship, while KSA, Kuwait and Bahrain display independent movements. In a recent study, Mohamed and Hasan (2018) document two-way causality between oil and stock markets in the GCC region during 2005-2015. Sina et al. (2018) reports a positive association between oil and stock markets in Iran after studying data from 1993 to 2014 through the application of GARCH and ARDL models. The findings are confirmed by Shirazi and Meibodi (2020) for the Iranian market based on quarterly data for 17 years (1991-2007) by applying Nonlinear Autoregressive Distributed Lag (NARDL) model. Berna and Istemi (2015) finds little evidence of volatility spillover from oil to stock markets in Turkish economy during 1990-2011 period, while Polat (2020) documents a negative association between oil and stock markets in Turkey on a data set from 1988 to 2018.

Caspian-basin region is one of the significant oil exploration and trade markets. A positive impact of rising oil prices is expected in the Russian market (exporter) (Yurievich, 2018). The findings of a positive association between oil and stock markets in Russia are confirmed by Hazem and Akhsyim (2017) after studying 16 years (2000-2015) data through the application of VECM. Alexander (2017) also document the positive association of stock market and oil prices in Russian institutional settings for a period 2003-2017 based on weekly data through the application of VAR model. In a recent study Kose and Ünal (2020) document the higher impact of negative oil price shocks (than positive) on stock returns in three Caspian-basin oil-exporting countries (Iran, Kazakhstan and Russia) during the period 2005-2018.

South and Southeast Asia host close to 1/3rd of the global population is one of the major consumers of oil globally. Literature carries some evidence on the relationship between oil and stocks in this region. Priyanka and Kumar (2020) study Indian market (net-importer) through the application of ARDL model using monthly data for 19 years (2000-2018) and document the significant positive impact of oil market variations on stock returns in short as well as in the long run. Chinnadurai et al. (2019) also, report similar results for a few Indian aviation stocks from 2007 to 2018 by using Granger causality tests. Ankit et al. (2018) document impact of oil prices on the Indian stock market using weekly data between 2010 and 2017. Results support the positive impact of crude oil futures prices on the energy index. Mohammad et al. (2017) study the Indonesian market from 1996 to 2016 by applying VAR techniques. Findings suggest a significant relationship between oil and stock markets during higher oil prices period. Also, the positive association between oil and stock markets is documented by Pasrun et al. (2015) for the Indonesian market from 2004 to 2013 by using VAR technique. Negative long-run association of stocks and oil markets reported by Ekhlas et al. (2017) for the Malaysian market based on sample period 1991-2016 through the application of ARDL.

East Asian growth economies (China, Japan and South Korea) depend on oil consumption and fall in the list of top five oil importers, along with USA and India in 2018[1]. Specific studies have focused on the relationship between oil and stocks in this region, in recent times. Cai et al. (2020) study the relationship between oil and East Asian stock markets (China, Japan and South Korea) using daily data from 2000 to 2016. Authors document the usefulness of crude oil in portfolio diversification but for the short term. Khan et al. (2019) study association of oil and Shanghai Stock Exchange (China) for a period 2000-2018 and finds a negative relationship by using ARDL technique. The results of negative association (for the short run) are confirmed by Hsiao et al. (2019) after studying the relationship between oil and renewable energy stocks in china for a period 2014-2018.

Finally, a selected review from the African region. Chikezie et al. (2019) study relationship between the stock market and oil prices in Nigerian settings, using monthly data from 1994 to 2016 through the application of ARDL and bound testing models. Findings suggest a lack of significant integration in short as well as long run. The findings are confirmed by Felix et al. (2019) in another study on the Nigerian market. The author used monthly data from 1985 to 2017 through the application of VAR model. Similar results are documented by Olamide et al. (2017) in Nigerian institutional settings through the application of OLS by using annual time series from 1985 to 2014. However, findings documented by Olugbenga (2012) show an association of oil and stock markets in short as well as in the long run, during 1985-2009 period.

A selected review of literature depicts the association of stocks and oil markets, with a little evidence on lack of integration and volatility spillover. Furthermore, evidence supports both hypotheses, including positive and negative association. South Asian nations are less represented in the literature. Few studies on the association of oil and stocks are conducted in the Indian market. However, we could not find evidence in the literature on the relationship between oil and stock returns from Pakistani institutional settings (the second-largest market in South Asia). This study is expected to fill this gap in the literature.

2.1. Institutional Settings

Pakistan is a net oil-importing country, and oil consumption is one of the major energy sources in Pakistan. Oil has a significant contribution to the domestic economy and consumes a major

1 http://www.worldstopexports.com/crude-oil-imports-by-country/ accessed on March 28, 2020.

chunk of money spent on imports (at times close to 30%) (SBP, 2015). In oil consumption, Pakistan has ranked 33rd in the world while 53rd in oil production. The country has 354 million barrels of proven oil resources, which is equivalent to 1.7 times its annual consumption. Pakistan consumes 556,000 barrel of oil per day (per capita consumption 42 gallons, per year) (Worldometers, 2016). Pakistan stock exchange (PSX), established in 2016 by merging three stock exchanges in Pakistan (Karachi Stock exchange [1947], Lahore stock exchange [1970] and Islamabad stock exchange [1989]). Securities and Exchange Commission of Pakistan (SEP) regulate the market, established in 1997 (earlier known as Corporate Law Authority—CLA). Pakistan has experienced growth in the 1960s; however, nationalisation of 1970s put break. In the 1990s, Pakistan started the privatisation program and introduced reforms at the stock market (Qayyum and Kemal, 2006). KSE all shares, KSE-100 and KMI-30 are major indices. KSE-100 represents conventional stocks, and KMI-30 is an Islamic index. KSE-100 includes 100 companies listed on PSX, representing multiple sectors and higher market capitalisation. KMI-30 represents Islamic stock market and consists of 30 leading *Shari'ah* compliant companies[2]. PSX has shown growth momentum during the review period (Figure 1). The market was declared Asia's third-best performer in 2016 by Bloomberg[3]. In May 2017, KMI-30 Index reached to 87,448 (from 12,939) and KSE-100 index to 50,592 (from 7,721) in July 2009. Average annual growth is 81% (KMI-30) and 69% (KSE-100). From mid-2017, PSX started the decline, primarily due to political uncertainty in the country.

3. METHODOLOGY

3.1. Data

Sample period is from 6/2009 to 2/2020. We select 2009 as the starting point because of the availability of Islamic stock index (KMI-30) at the Pakistani market. KMI-30 was started in 2008 and data is available from 2009 onward, from the selected database. Monthly data for selected variables including stock market (KMI-30; KSE-100), Oil prices (crude oil WTI futures), gold prices (gold futures) and exchange rate (PKR/USD) is downloaded from Fusion Media Limited (www.investing.com/). Our variable of interest is oil market volatility transmission to stocks, while gold and currency are used as control variables. Data trends (in log series) are presented in Figure 2, Panel-A. Although the graph depicts variations, however, overall upward joint movement of series exists in the initial period. In the later-half, indications of oil-price fluctuations are depicted. Panel-B depicts trends in log return series (differenced data) very close to a random walk.

3.2. Econometrics

The level of co-movement, as well as cause and effect, are documented through formal testing in the next section. We employed the standard Johansen cointegration test to document long-term co-movement of the time series. In order to determine the stationarity status of data (to run cointegration at log series and regression at log-return series), we calculated the group unit root test (Individual Root-Fisher-ADF).

Raw prices converted into log-returns by using the following equation:

$$r_t = \ln\left(\frac{p_t}{p_{t-1}}\right) \quad (1)$$

r_t is the return over time; *ln* is natural log; p_t price in the current month; and $p_{(t-1)}$ price in the previous month.

To check the issue of multicollinearity, we applied the correlation test. Regression model estimated separately for Islamic (KMI-30) and conventional (KSE-100) stock markets. Following is the basic regression model tested in this study.

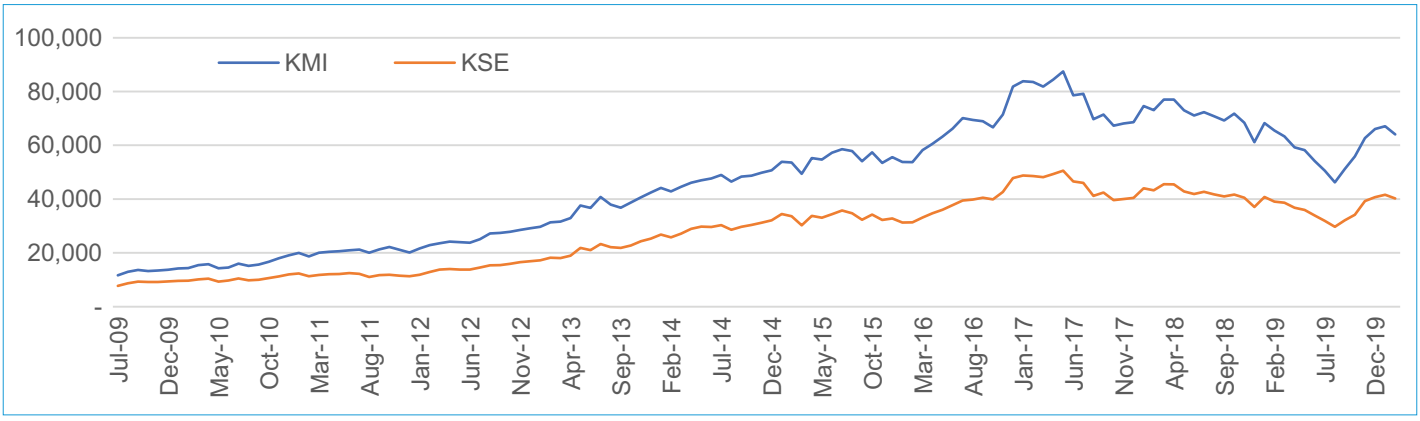
$$(r_t) = a_t + b_1(op_t) + b_2(gp_t) + b_3(xr_t) + e_t \quad (2)$$

r represents stock returns; *a* is Intercept (constant); *b* for beta coefficient; *op* represents oil prices; *xr* exchange rate; and *gp* for gold prices; *e* error term and subscript *t* for time;

2 Shari'ah compliant stocks are selected from listed companies at PSX. KMI-30 Stock screening includes multiple tests including Halal business, limit (based on total assets) for interest based debts (37%), Haram investments (33%), liquid assets (75%); Haram income (5% of total revenue); and market to book value net liquid assets > 1. https://www.almeezangroup.com/investor-education/shariah-methodology/ [accessed march 30, 2020]

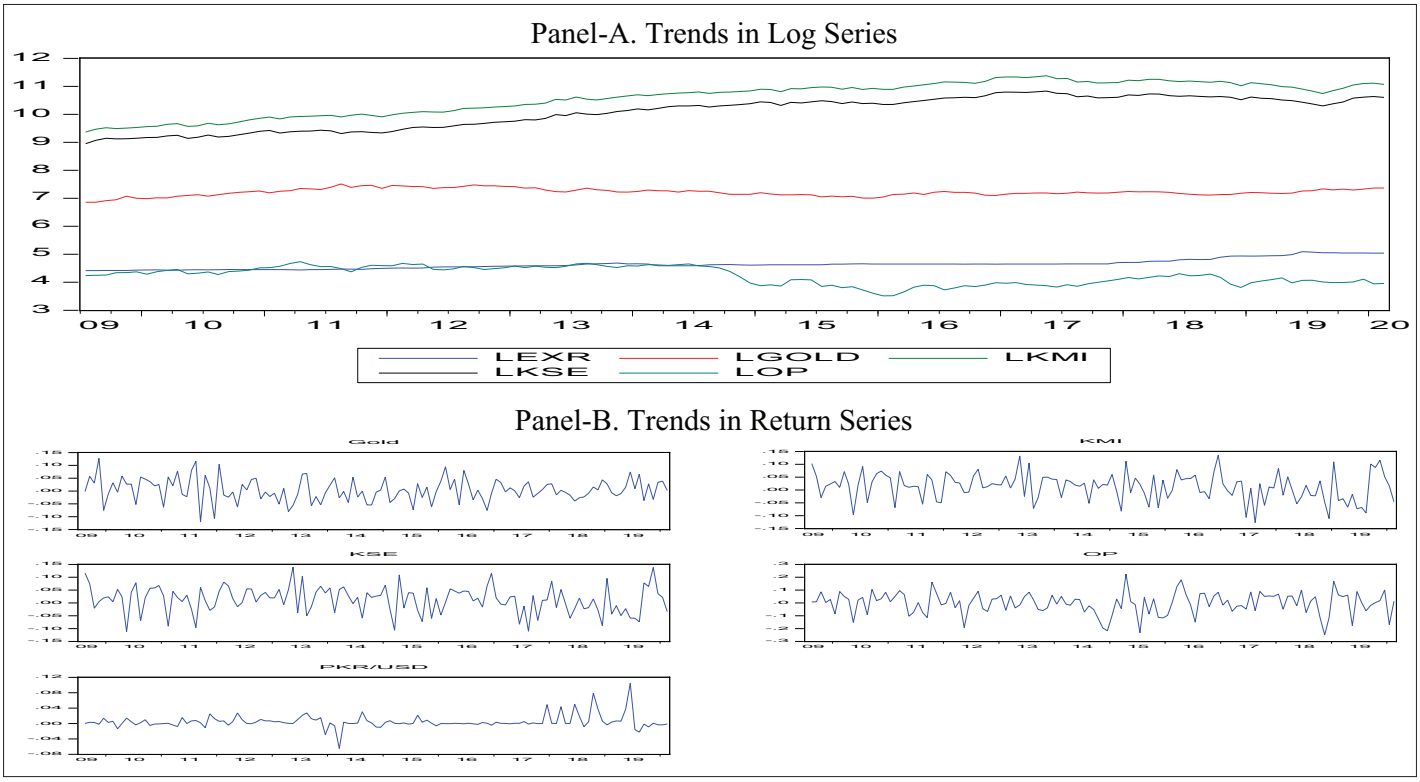
3 https://www.bloomberg.com/news/articles/2016-12-28/here-are-the-best-and-worst-performing-assets-of-2016 accessed on March 30, 2017.

Figure 1: Trends in indices at Pakistan stock exchange (2009-2020)



Source: Constructed by the author; data from www.Investing.com

Figure 2: Data trends (2009-2020). Panel-A. Trends in log series. Panel-B. Trends in return series



Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com. Panel-A depicts log series and Panel-B displays log-return series

We select the KSE-100 index as a proxy for the conventional stock market and KMI-30 index for Islamic stocks. Oil market proxied by crude oil futures historical prices and the gold market is represented by gold futures historical data, while the exchange rate is historical PKR/USD historical data. Literature suggests an association of oil and stock market in both directions (positive and negative). Also, the literature suggests a lack of integration of oil and stocks; however, evidence on joint movement outnumber the independent movements (see literature section). We expect a positive association of oil and stock market following the hypothesis of demand push in prices of oil—an indication of increased production and booming markets.

4. ANALYSIS AND RESULTS

4.1. Descriptive Statistics

We start our analysis through descriptive statistics (Table 1). As per results, highest monthly returns for the selected period are reported for stock markets (KMI 1.34% and KSE 1.30%) and least positive returns are for the gold market. Average monthly returns for oil prices are negative (−0.22%), signifying higher decline than the increase in oil prices during the sample period. Median values are far from mean for all series, signifying the issue of outliers. Highest coefficient of variation (a relative measure of variations) is reported for oil prices and least for the exchange rate. Kurtosis of all series are close to 3.00 except for exchange rate. Jerque-Bera values are in normality zone, except for the exchange rate. Trends in the log return series, presented in Figure 1-Panel-B, confirm that differenced data is close to normality.

Table 1: Descriptive statistics (return series)

Description	KMI	KSE	OP	PKR/USD	Gold
Mean	0.0134	0.0130	(0.0022)	0.0049	0.0040
Median	0.0189	0.0198	0.0092	0.0009	0.0011
St. deviation	0.0535	0.0522	0.0851	0.0172	0.0445
Coef. Variation	3.99	4.02	(37.94)	3.53	11.09
Skewness	-0.2353	−0.2202	-0.4983	2.0756	0.0556
Kurtosis	2.8199	2.9066	3.4839	15.2609	3.2151
Jerque-Bera	1.3159	1.0483	6.3717	884.5468	0.3088
Probability	0.5178	0.592	0.0413	0.0000	0.8569

Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com

4.2. Stationary Testing

Results of unit root testing are presented in Table 2. Group unit root testing are presented in panel-A. ADF-Fisher Chi-square value, as well as ADF-Choi Z-stat., confirm the presence of unit root in log series which is disappeared at the first difference (log return series). Similarly, individual unit-roots of all series depict unit root at log-level but not on the first difference (see Probability values). Unit root results indicate that data is non-stationary at log-level and stationary at log-return—leading to fitness for cointegration at log-level and regression at log-returns.

4.3. Cointegration Testing

Results of long-run integration through application of Johansen model are presented in Table 3. Lag-length is selected by the lag-length criterion of AIC. Lag 1-1 is found appropriate for the selected time series. We applied EViews option six to determine the appropriate model for the calculation of cointegration. Model-2 (Trend assumption: No deterministic trend [restricted constant])

Table 2: Unit root testing

Variables	At Level		Statistics	At first difference	Results
	Statistics	Probability		Probability**	
Panel-A. Group Testing					
ADF-Fisher Chi-square	13.42	0.20	350.61	0.00	$I(1)$
ADF-Choi Z-stat	−0.15	0.43	-17.87	0.00	$I(1)$
Panel-b. Individual Series					
KMI		0.14		0.00	$I(1)$
KSE		0.24		0.00	$I(1)$
Gold		0.06		0.00	$I(1)$
Oil		0.57		0.00	$I(1)$
Exchange Rate		0.99		0.00	$I(1)$

Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com. **Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution; All other tests assume asymptotic normality

Table 3: Cointegration testing

Panel-A No. of CE(s)	Null	Alternate	Eigen value	λ trace	0.05 C.V	Prob.*	Lags
01	H_0 r = 0	H_1 r = 1	0.243	83.78	76.97	0.013	1-1
Panel-B	Null	Alternate	Eigen value	λ_{max}	0.05 C.V	Prob.*	Lags
01	H_0 r = 0	H_a r > 0	0.243	35.13	34.80	0.045	1-1

Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com

is found appropriate with one cointegration equation under both criteria (Trace test and Max-eigenvalue test). As depicted in the table, calculated values of both tests (λ trace and λ_{max}) are higher than critical values at 5% significance level—leading to evidence of co-movement among selected time series in the long run.

Trace test and max-eigenvalue test indicate 1 cointegrating equation at the 0.05 level; *Mackinnon-Haug-Michelis (1999) P-values; Sample (adjusted): 2009M09-2020M02; Trend assumption: No deterministic trend (restricted constant); Series: LEXR LGOLD LKMI LKSE LOP.

4.4. Multicollinearity

In order to proceed formally to test the regression model, it is recommended to check the multicollinearity status between independent variables. We have three independent variables in this study—oil prices, gold prices and exchange rate. As depicted in Table 4, the highest correlation is between two stock market indexes, but they are not used in any regression model together (as independents). In the case of independent variables, the highest correlation is depicted by oil prices and gold market (19%)—indicating clarity of series from multicollinearity. However, interestingly there are positive as well as negative correlations. For example, two variables gold prices and exchange rate show negative correlations with the stock market, and only oil prices display a positive association with dependent variables (as expected). Such indications will be confirmed through formal testing—regression analysis (in the following section).

4.5. Regression Analysis

After testing for long-run co-movement, unit root, and multicollinearity, we employed the formal test of regression based on our model (see research methodology section), and results are reported in Table 5. We estimated two equations separately for conventional (KSE-100) and Islamic (KMI-30) indices. Panel-A

Table 4: Correlation

Description	KMI	KSE	OP	Gold
Islamic market (KMI)	1.00			
Conventional market (KSE)	0.957	1.00		
Oil prices (OP)	0.270	0.235	1.00	
Gold prices (GP)	−0.088	−0.168	0.186	1.00
Exchange rate (XR)	−0.191	−0.181	−0.058	0.047

Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com

depicts the results of a conventional index. The overall fitness of the model is functional as depicted by Durbin-Watson stat close to 2.00 and the probability of F stat. (0.000). Adjusted R Square is close to 11% (not very high) indicating the role of other variables in the creation of volatility in Pakistani market. However, this study documents the role of international markets (oil, gold and currency) in stock prices at PSX. Variable of our interest (oil market) depicts a significant positive impact on stock returns. The beta coefficient of oil prices is 16% and significant at 1% level. The results signify the positive impact of oil price shocks on stock returns at PSX. Likewise, gold prices do contribute to stock return variations negatively. The beta coefficient of gold is −25% (significant at 5%). However, the exchange rate, although it carries a higher beta coefficient (−47%), is significant at the 10% level.

Results for Islamic index (KMI-30) are presented in Panel-B (Table 5). The overall fitness of the model is appropriate as depicted by the probability value of F stat. (0.00) and Durbin-Watson stat (2.00). Adjusted R square (10%) is not on the higher side—an indication of other factors in variations of stock returns. Oil prices explain 18% (slightly higher than KMI-100) variations in stock returns and significant at 1% level. Gold prices do contribute up to 16% variations but not significant (even at 10%)—an indication of lack of diversification in the gold market by Islamic investors, surprisingly. Currency market shows a negative association of

Table 5: Regression results Pakistan stock exchange

Model	*Ad-R*²	Constant-Coef.	OP-Coef.	Gold-Coef.	XR-Coef.
	D-W Stat. (Prob-F stat.)	T stat. (P value)	T stat. (P value)	T stat. (P value)	T stat. (P value)
Panel-A. KS					
E-100	0.105	0.016	0.162*	−0.247	−0.472
Conventional	1.977	3.646	3.088	−2.453	−1.846
Market	(0.000)	(0.000)	(0.002)	(0.015)	(0.067)
Panel-B. KM					
I-30	0.100	0.017	0.179*	−0.161	−0.522
Islamic	2.004	3.620	3.313	−1.553	−1.986
Market	(0.001)	(0.000	(0.001)	(0.122)	(0.049)

Source: Constructed by the author; monthly raw prices data for period 06/2009 to 02/2020 from www.investing.com. *Significant at 1%

higher degree (−52%) and significant at 5% level. It may be indicating discouragement for Islamic investors abroad due to depreciation of Pakistani currency against the dollar.

The negative association of stocks with gold indicates the selling of stocks to buy gold (when gold prices rising as opposed to stocks). Similarly, depreciation in local currency discourages foreign investors from investing in stocks because of lesser profits after conversion back into foreign currency. Positive association with oil prices is an indicator of the demand-pull rise in oil prices, signalling more production and booming businesses.

5. CONCLUSION

This study documents the role of global markets (oil, gold and currency) in stock return variations at PSX, with a focus on oil prices, for a period 2009-2020. We document findings through the application of cointegration and regression techniques. Johansen-cointegration test suggests long-run integration of selected time series. Regression findings suggest oil prices cause variations in stock return generation process at PSX, including conventional and Islamic indexes. The positive association between stocks (dependent) and oil prices (independent) is highly significant (at 1%) in multiple regression settings which include gold and exchange rate as control variables. Control variables do cause variations in stock returns but significant at a higher level with negative coefficients. Pakistan is a net oil-importing country, and these results support the demand push inflation hypothesis in the oil market—signalling for increased economic activity.

Policy recommendations include NOT to diversify in oil market and stocks at PSX. However, investors may get a signal from the global oil market about the future movements of PSX while designing portfolio strategies. For the public sector, we recommend long term contracts with oil-exporting countries for continuity in the supply of oil for the smooth running of the economy. Pakistan needs to engage with GCC in the trade of agricultural goods for oil to lessen the burden on the current account. Additionally, economic managers of the country need to be very careful in exchange rate management to avoid negative consequences of devaluation.

REFERENCES

Abdulrahman. (2020), Long run association of stock prices and crude oil prices: Evidence from Saudi Arabia. International Journal of Energy Economics and Policy, 10(2), 124-131.

Alexander, B. (2017), Does oil prices uncertainty affect stock returns in Russia: A bivariate generalized autoregressive conditional heteroskedasticity-in-mean approach. International Journal of Energy Economics and Policy, 7(4), 224-230.

Ammar, L.R., Mahmoud, A.S. (2020), Dynamic linkages between the oil spot, oil futures, and stock markets: Evidence from Dubai. International Journal of Energy Economics and Policy, 10(1), 377-383.

Ankit, S., Sasmita, G., Harsh, V., Sujeet, S., Rohan, S., Vishwaroop, S. (2018), Relationship between crude oil prices and stock market: Evidence from India. International Journal of Energy Economics and Policy, 8(4), 331-337.

Berna, A., Istemi, B. (2015), Crude oil price shocks and stock returns: Evidences from Turkish stock market under global liquidity conditions. International Journal of Energy Economics and Policy, 5(1), 54-68.

Cai, X., Hamori, S., Yang, L., Tian, S. (2020), Multi-Horizon dependence between crude oil and East Asian stock markets and implications in risk management. Energies, 13(2), 294.

Chang, C.L., McAleer, M., Tian, J. (2019), Modeling and testing volatility spillovers in oil and financial markets for the USA, the UK, and China. Energies, 12(8), 1-24.

Chikezie, A.K., Ezeaku, H.C., Josaphat, U.J., Okereke, E.J. (2019), Does oil price fluctuation affect stock market returns in Nigeria? International Journal of Energy Economics and Policy, 9(1), 194-199.

Chinnadurai, K., Murugesan, S., Balasundram, M., Sankaran, V. (2019), Relationship between crude oil price changes and airlines stock price: The case of Indian aviation industry. International Journal of Energy Economics and Policy, 9(5), 7-13.

Ekhlas, A.H., Usama, A.M., Adebola, S.S. (2017), The influence of oil price shocks on stock market returns: Fresh evidence from Malaysia. International Journal of Energy Economics and Policy, 7(5), 235-244.

Ewinga, B.T., Malik, F. (2016), Volatility spillovers between oil prices and the stock market under structural breaks. Global Finance Journal, 29, 12-23.

Felix, C.A., Victor, O.O., Obiamaka, P.E., Hillary, C.E. (2019), Energy prices and the Nigerian stock market. International Journal of Energy Economics and Policy, 9(6), 33-37.

Filis, G., Degiannakis, S., Floros, C. (2011), Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. International Review of Financial Analysis, 20(3), 152-164.

Hani, E.C. (2019), The impact of oil prices on stocks markets: New evidence during and after the Arab spring in gulf cooperation council economies. International Journal of Energy Economics and Policy, 9(4), 214-223.

Hazem, M., Akhsyim, A. (2017), Oil price shocks and stock market returns in the three largest oil-producing countries. International Journal of Energy Economics and Policy, 7(5), 312-322.

Horobet, A., Vrinceanu, G., Popescu, C., Belascu, L. (2019), Oil price and stock prices of EU financial companies: Evidence from panel data modeling. Energies, 12(21), 4072.

Hsiao, C.Y.L., Lin, W., Wei, X., Yan, G., Li, S., Sheng, N. (2019), The impact of international oil prices on the stock price fluctuations of China's renewable energy enterprises. Energies, 12(24), 4630.

Hussein, A., Zengxiang, W.E., Glenn, B.M. (2018), Dynamics of Canadian oil price and its impact on exchange rate and stock market. International Journal of Energy Economics and Policy, 8(3), 107-114.

Khan, M.K., Teng, J.Z., Khan, M.I. (2019), Asymmetric impact of oil prices on stock returns in Shanghai stock exchange: Evidence from asymmetric ARDL model. PLoS One, 14(6), e0218289.

Kose, N., Ünal, E. (2020), The impact of oil price shocks on stock exchanges in Caspian Basin Countries. Energy, 190, 116383.

Mohamed, A., Hasan, M. (2018), International and macroeconomic determinants of oil price: Evidence from gulf cooperation council countries. International Journal of Energy Economics and Policy, 8(1), 69-81.

Mohamed, E.H.A., Julien, F. (2009), On the short-term influence of oil price changes on stock markets in gcc countries: Linear and nonlinear analyses. Economics Bulletin, 29(2), 795-804.

Mohammad, A.D., Dominicus, S.P., Bagus, S. (2017), Impacts of oil price shock on sector returns with regime-switching approach: New evidence from indonesian stock market. International Journal of Energy Economics and Policy, 7(5), 44-59.

Olamide, T.O., Rita, U.O., Sunday, O.I. (2017), Crude oil price volatility and its impact on nigerian stock market performance (1985-2014). International Journal of Energy Economics and Policy, 7(5), 302-311.

Olugbenga, A.A. (2012), Oil price shocks and stock market behaviour: The Nigerian experience. Journal Economics, 3(1), 19-24.

Pasrun, A., Usman, R., Edi, C., Manat, R. (2015), Modeling of the dynamics relationship between world crude oil prices and the stock market in Indonesia. International Journal of Energy Economics and Policy, 5(2), 550-557.

Polat, O. (2020), Time-varying propagations between oil market shocks and a stock market. Borsa Istanbul Review, 30, 1-8.

Priyanka, A., Kumar, M.M. (2020), Effect of oil fluctuation on stock market return: An empirical study from India. International Journal of Energy Economics and Policy, 10(2), 213-217.

Qayyum, A., Kemal, A.R. (2006), PIDE Working Paper 2006:7. Pakistan Institute of Development Economics. Available from: https://www.pide.org.pk/pdf/Working%20Paper/PIDE%20Working%20Papers%202006-7.pdf. [Last accessed on 2020 Mar 26].

Roberto, S.S., Cuauhtémoc, C.V., Francisco, V.M. (2017), Impact of oil prices on stock markets in major Latin American countries (2000-2015). International Journal of Energy Economics and Policy, 7(4), 205-215.

SBP. (2015), Monthly Reports on Exports and Imports. Karachi: State Bank of Pakistan.

Shabbir, A. (2019), The impact of oil price uncertainty on stock returns in Gulf countries. International Journal of Energy Economics and Policy, 9(6), 447-452.

Shirazi, M., Meibodi, A.E. (2020), Reaction of stock market index to oil price shocks. Iranian Economic Review, 24(1), 99-128.

Sina, D., Alireza, F., Firouz, F., Hossein, A. (2018), The impact of oil revenue shocks on the volatility of Iran's stock market return. International Journal of Energy Economics and Policy, 8(2), 102-110.

Worldometers. (2016), Pakistan Oil. Available from: https://www.worldometers.info/oil/pakistan-oil. [Last accessed on 2020 Mar 26].

Xanthi, P., Apostolos, K., Grigoris, G., Nikolaos, S. (2016), The impact of gold, bond, currency, metals and oil markets on the USA stock market. International Journal of Energy Economics and Policy, 6(1), 76-81.

Yurievich, M.A. (2018), Pricing in oil market and using probit model for analysis of stock market effects. International Journal of Energy Economics and Policy, 8(2), 69-73.

Zhang, W., He, X., Nakajima, T., Hamori, S. (2020), How does the spillover among natural gas, crude oil, and electricity utility stocks change over time? Evidence from North America and Europe. Energies, 13(3), 727.