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The time-varying propagation between oil market and stock market- An evidence of Pakistan Stock Exchange, PSX

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Abstract

The prime objective of this study is to find out the time-varying propagation between the oil market and stock market. For this purpose the crudeoil future contracts in real time was chosen as proxy for an oil market determinant while two indices at Pakistan stock exchange were taken as stock market determinants. In this regard KSE100 index and KMI30 index (the Islamic index) were considered as stock market variables to examine short run or long run relationship amongst the oil market and stock market. The analysis was based on time series data. The weekly closing prices were collected for the period ranging from June, 2009 to August, 2020 with 583 total observations. The study used the Johanson and Juselius (1990) technique to examine the long run cointegration between the variables. The ADF test postulated that all series were at 1(0) nonstationary but it became stationary when taking it at 1st difference. The Johanson cointegration test examined that Pakistani stock indices were cointegrated in the long run with the crudeoil. Once Johanson test founded the long run relationship among the variable, VECM is used to examine the short run dynamics of long run equilibrium relationship. The variance decomposition revealed that fluctuations in the oil prices were strongly endogenous from its own variance in the short run but strongly exogenous in the long run from others independent variable in the model. The impulse response function demonstrated that response of KSE100 and KMI30

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both to the shock of crudeoil showed increasing trend in the short run but in long run they have constantly decreasing trend.

Keywords: Augmented Dickey Filler test, Johanson cointegration, vector error correction, variance decomposition, impulse response

1. Introduction

Pakistan is oil importing country and resultantly it's responds to oil shocks is well documented. The total consumption of Pakistan for Oil in December, 2019 before the COVID-19 pandemic outbreak is reported at 445.864 Barrels/Day. This demand was less than the previous year consumption, showing 489.197 Barrels/Day in Dec, 2018 (CEIC, database). The overall record consumption was recorded in 2017 with total of 588.616 Barrels/Day from time 1965 to 2019. Pakistan ranks 33th among the world's oil consumption countries, resuming 0.6% of the world total consumption. On the other hand, Pakistan holds total Oil reserves of 353,500,000 barrels, ranked as 52th in the world and accounting of 0.02% share of the world total oil reserves. Hence this huge difference between oil consumption and oil exploration reserves put serious pressure on the economy including its stock market (Energy book of Pakistan 2018).

In this whole scenario, the oil products are considered as prime importance for the economy as well as for the researchers. Earlier researchers have made efforts to investigate casual relation between the oil price and stock returns. Mostly such worked have been performed in the developed economy and they have investigated the cointegration results at international stock market indices like S&P 500, Nasdaq etc. The work regarding to investigate the long run cointegrated relationship between the oil market and stock returns at Pakistan Stock market is minimal.

The oil commodity is considered as the main source of energy in all over the world. No one can deny the importance of oil in the economy structure whether it is oil exporting countries or oil importing economies. In other words the reactions of the economy towards oil prices are also well documented and tested by the researchers and financial analysts. The crude oil market is the biggest commodity market that has significant impact on the economy. Therefore the oil prices have also great impact on the consumption and production of the commodity (Cinter et al, 2013).

A lot of previous works have investigated the linearity between the commodity market and stock market (Kanjilal and Ghosh 2014). They also examined the volatility relationship amongst the variables employed in their study (Arouri et al, 2011; Hammoudeh and Yuan, 2008; Sadorsky, 2014). The results of the previous work founded the significant volatility transmission from one market to another in a linear relationship pattern. On the other hand, very few studies are found to investigate such relationship with regard to Pakistani stock market. Moreover in previous studies due to small sample size they failed to capture the volatility transformation from commodity market to stock market both in short run and long run.

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The present study was primarily conducted to investigate the time-varying propagation between the oil market and Pakistani stock market. In this context the crude oil at WTI was considered as proxy for oil commodity while two local market indices including KSE100 and KMI30 were used as stock market determinants. The study assumed weekly data with 583 observations. The main objective of the study is to determine that how stock indices prices at Pakistan stock exchange PSX responds to the international oil market's shock in the short run as well as long run. The significance of the study captures two main areas. First this study will work in policy implications and trace the stock market direction. Second, the study also adds to the existing literature that will guide the new researchers in this field.

The structure of the paper is as follow. First chapter covers the introduction, followed by second one that contain about the literature review and the previous work performed by the researchers. The third chapter included the research methodology and the next fourth chapter discloses the data analysis and interpretation chapter. The last one is about the conclusion and recommendation.

2. Literature Review

The past studies unveil that crudeoil is very influential physical commodity and have very strong connection with the capital market. This connection is quite visible when the change in crudeoil prevails for long period of time, or in other words stock returns may respond very quickly to this shock. But in case when the oil market jumps down or up for short period of time, then the stock market may not behave so actively. More over this time-varying propagation may differ from market to market or with the development made in the global equities market. With the introduction of new class of equity in the capital market known as Islamic equity, it become very crucial to examine the relationship between the crudeoil and the stock market. The Islamic equity market operates along with conventional equity market but follow certain Islamic rules of law (Sharia).

2.1 Islamic Equity Market (KMI-30)

In Pakistan, the Islamic equity market was introduced in the year 2009 while 30 June, 2008 is considered as the base period for KMI30. The official name is KMI30 i.e. Karachi Meezan Index 30 in which 30 top listed companies have been displayed that offer Islamic mode of financing to the public by follow the Sharia criteria. The Pakistan stock exchange PSX and Meezan Bank jointly offered this Islamic-based financing. The KMI30 used free float market capitalization for index calculation. In the previous research studies, the researchers mostly examined the relationship between the conventional stock market and crudeoil market but mostly ignored the Islamic equity market.

Huang et al (1996) used VAR approach to investigate the relationship between the Oil future return of WTI and US stock returns. Daily data was used in the study. The results confirmed that individual stock returns of some company have affected by the oil future prices but it has no impact on the S&P 500 as whole.

Similarly Jones & Kaul (1996) used quarterly data and founded the relationship between the oil future prices and the S&P 500. Further numerous studies have undertaken to determine

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the asymmetry of oil shocks, and to find out the dynamic interaction between the oil prices and stock returns.

The recent research studies observed very close interaction between the oil market and stock market in the developing economy. It is because of the fact that oil is considered as indispensible for running the economy in right direction. Not only the oil exporting countries rely on the oil's revenue to overcome the budget deficit but the oil importing countries also respond very quickly to the oil shock in the market. Because Africa is homeland to some of the world largest oil exporting and oil importing countries. So the oil market and stock market connection is equitable (Onwe, 2012).

Further investors are also very keen to observe the oil market before making any investment decision in the stock market i.e. to hold stock or some other type of commodities like gold (Gourrene & Mendy, 2018). Similarly in the Middle East, Saudi Arabia, Iraq, Kuwait are mainly oil exporters. Their revenue matched above 70% from the oil exporting. So their response to the oil price fluctuations in the world market is visible.

In most of the previous studies, researchers tried to show the interaction between the oil prices and stock return or to investigate the possible effect of oil prices at WTI on the stock returns. But in the present course of study, the researcher has shown the time-varying propagation between the oil market and Pakistan stock market. Because it is very pertinent to examine that how stock returns behave to the oil market's movements. In this study, the researcher observed two markets to finalize his arguments. So the oil future contract in real time at WTI and two indices at PSX i.e. KSE100 & KMI30 were chosen for this purpose. The prices were calculated on weekly basis. The Johanson cointegration test was applied to examine the long run relationship between the oil market and stock indices at Pakistan Stock exchange PSX.

3. Research Methodology

Research methods determine the procedures of developing a particular research design for data collection and data analysis. The current study is based on time series data. We collected weekly data for the period ranging from June 2009 to august 2020. The main focus of the study is to analyze time-varying propagation between two different markets of the economy including oil market and stock market. Both markets are of vital nature in the economy and may affect the whole economy as well.

The current paper utilizes the following model with three time series, including oil products at WTI markets, KSE100 index, and KMI30 index. For this purpose, the Crude oil WTI futures contract in real time is used as proxy for oil market determinant while KSE-100 and KMI-30 indices are used as domestic stock market determinants. The closing prices of the index KSE-100 and crude oil are taken to examine the time varying propagation between the stock and oil market determinants.

$$\mathbf{Crudeoil\_P_t = \alpha_0 + \beta_1 KSE100\text{-}P_t + \beta_2 KMI30\_P_t + \varepsilon_t}$$

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Two very popular techniques are commonly used to find out the short run and long run casual relationship amongst variables. These techniques are well known as unrestricted VAR estimates and Vector Error Correction Model (VECM).

In this study, time series techniques such as unit root analysis, Cointegration, vector error correction modeling i.e. VECM were employed to examine the nature of the structural relationship between oil market and Pakistan Stock market. Before going to run the Johanson Cointegration test, some tests are preliminary. For example, unit root test is mandatory to find out the stationary of data. Because Johanson assumes that all series are nonstationary at level but stationary at 1st difference. Then selection criteria are performed on the basis of VAR estimates to find out the optimal lag. Once Johanson evidenced the cointegration then VECM is used to examine the long run as well as short run casual relationship among variables (Eagle & Granger, 1987).

4. Data Analysis

4.1 Unit Root Test

Time series data are usually non stationary and hence do not fulfills the basic assumption of OLS estimation (Ender, 1995). The mean, variance, and covariance of a nonstationary series vary with time due to the trend. Such trend should be removed or in other words converted into stationary mode prior to any estimation. Unit root test is the ultimate technique conducted to check out the stationary of data. For this purpose, ADF test is performed. This test assumes two hypotheses i.e. $H_{0:}$ Series contains unit root (non-stationary)

$H_{1:}$ Series does not contain unit root (stationary)

The test results are summarized in the below table as well.

4.1.1 Augmented Ducky Filler Test (ADF)

Variables	ADF- Fisher Chi-Square, At LEVEL		ADF- Fisher Chi-Square, At 1st Difference	
	t-Statistics (critical stat)	Prob.	t-Statistics (critical stat)	Prob.
Crudeoil_P	-1.342273 (-3.441395)	0.6112	-14.78373** (-3.441395)	0.0000
KSE100_P	-1.102905 (-3.441357)	0.7162	-15.34075** (-3.441395)	0.0000
KMI30_P	-1.352841 (-3.441376)	0.6061	-20.46492** (-3.441376)	0.0000

p- value *, ** in the table show 5% and 1% significant level

The table4.1.1 summarized the results of the Augmented Ducky Fuller test used to check the stationary of data. The results are shown at level and at 1st difference. All the endogenous variables including crudeoil, kse100, and kmi30 are checked for stationary. As it is apparent from the above table, that all endogenous are non-stationary at level since the t statistical value of crudeoil, kse100, and kmi30 are less than its respective critical value which is shown in bracket (). The p value of t statistic in each case is insignificant at 1%, 5%, and 10% significant level. Hence all endogenous are non stationary at 1(0), thus the first pre requisite to examine the long run structural relationship by using Johanson cointegration test among the variables has

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been proved. Similarly the ADF test also confirmed that all endogenous variables under study are stationary at 1(1).

4.2 VAR Lag selection criteria

The interrelationship among the parameter estimates rather than economic time series is well determined by the VAR estimates. Based on the VR estimates, the optimal lag is determined. The table 4.2.1 depicts the lag length selection criteria.

Table 4.2.1

VAR Lag Order Selection Criteria

Endogenous variables: CRUDEOIL_P KSE100_P KMI30_P
Exogenous variables: C
Date: 09/07/20 Time: 00:16
Sample: 6/14/2009 8/09/2020
Included observations: 575

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-13996.96	NA	2.82e+17	48.69553	48.71825	48.70439
1	-10776.63	6395.857	3.98e+12	37.52568	37.61656*	37.56113
2	-10756.56	39.66838	3.83e+12	37.48715	37.64618	37.54917
3	**-10735.27**	**41.82815**	**3.67e+12***	**37.44442***	**37.67161**	**37.53303***
4	-10728.36	13.50249	3.70e+12	37.45170	37.74704	37.56689
5	-10718.36	19.44189*	3.68e+12	37.44823	37.81172	37.59000
6	-10715.80	4.955497	3.77e+12	37.47062	37.90227	37.63897
7	-10707.75	15.48772	3.78e+12	37.47391	37.97372	37.66885
8	-10703.12	8.858546	3.84e+12	37.48911	38.05707	37.71063

* indicates lag order selected by the criterion

Based on lag order selection criteria, The AIC, FPE, and HQ criteria approved that the maximum lag of 3 is an appropriate for the dependant variable in the model to find out any long run integration. After selection of optimal lag on te basis of lag selection criteria, next to perform the Johanson cointegration test to examine whether long term cointegration among variables exist or not.

4.3 Johanson Cointegration Test

The Johanson and Juselius (1990) is primarily used technique to examine the cointegration long run relationship among the variables. Based on the ADF test results and VAR lag selection criteria, the Johanson cointegration test was performed to test whether long run relationship among the endogenous variables exists or not. The Johanson cointegration takes the series that stand as nonstationary at 1(0) to avoid specious results. The table 4.3.1 summarized the test results. The two test scores i.e. Trace statistics and Max-Eigen statistic of cointegration

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are documented to examine the long run integration among the endogenous variables. The tests results are summarized in the following table.

Table: 4.3.1 Johnson-Juselius Cointegration Test Results

Hypothesized No. of CE(s)	Trace Statistics	5 Percent		Max-Eigen Statistics	5 Percent	
		Critical value	Prob.		Critical value	Prob.
Crudeoil_P KSE100_P KMI30_P						
None*	32.80023	29.79707	0.0219	24.23413	21.13162	0.0177
At most 1	8.566099	15.49471	0.4070	7.738724	14.26460	0.4059
At most 2	0.827375	3.841466	0.3630	0.827375	3.841466	0.3630

1): Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
2): Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

The two test results have confirmed that 1 cointegration equ; exist among the variables. Under trace statistics, the hypothesized no. of cointegration at none* declares no cointegration as trace statistics is greater than the critical value at 5% sig level, thus rejecting the null hypothesis (H_0). Similarly, at most 1 the results showed that long run cointegration exist between the oil markets and stock markets thus confirmed that crude oil future contracts used as proxy for oil market determinant and KSE100 and KMI30 used as local stock markets indices are cointegrated in the long run. The trace statistics also indicates 1 cointegrating (equa) at the 0.05 level. The Max-Eigen statistics revealed the same results and confirmed that at none* there is no cointegration but at most 1 the cointegrating long run relationship between the oil market anomaly and stock markets indices was present. The results of the Johanson test postulated that oil market volatility was observed in the stock market in emerging economy like in Pakistan.

4.4 Vector Error Correction Model (VECM)

Once the Johanson test postulates the cointegration long run relationship between the variables, the next step is that of performing ECM i.e. Error Correction Model. ECM or VECM is used to examine the short run dynamics of long run equilibrium relationship. The vector error correction model (VECM) is extensively used to treat this type of short run and long run causality behavior. In the present study, based on the Johanson cointegration test results, we founded that oil market determinant i.e. crude oil and Pakistani stock market determinants i.e. KSE100, and KMI30 were cointegrated in the long run. Therefore VECM was performed in order to treat with short run dynamics. The coefficient of the ECM is termed as Error Correction Term (ECT) that demonstrates the extent to which each dependant variable in the model has the

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inclination to return to its long run equilibrium at the speed of its coefficient. The results of the VECM are shown the table 4.4.1.

Table 4.4.1 Casual Behavior via VECM

Short run casual relationship		**Long run causality**			
	Crudeoil_P		**D(Crudeoil_P)**	**D(KSE100_P)**	**D(KMI30_P)**
D(KSE100_P(-1))	2.48E-05	ECT	-6.63E-05**	-1.152584*	-1.192710
D(KM30_P(-1))	2.57E-05	T statistics	-2.04248	-2.89277	1.48361
		R- squired	0.038892	0.080658	0.057630
		F-statistics	3.306659	7.169185	4.997145

The VECM estimates the error correction term (ECT) which is the coefficient that determines the deviation of the relationship from long term equilibrium to short term parameters. The above table explains the short term dynamics based on Vector error correction model estimates.

The tables discloses that change in the lagged value of the D(KSE100_P(-1)) has made positive casual relationship with the crudeoil in the short run with the speed of coefficient of .00005248 (2.48E-05). This means that in short run the increase in the crudeoil price causes fluctuations or volatility in the prices of the KSE100 at Pakistan Stock exchange (PSX). The similar short run casual relationship was funded between the crudeoil price and the stock prices of the KMI-30 index. The coefficient is positive at 2.7E-05 but statistically was not significant at 1% level.

The results also present the adjustment coefficient (ECT) for the set of variables with the long run dynamics. The Error correction term (ECT) for D(Crudeoil_P) is statistically found significant at 5% with the anticipated negative sign of -6.63E-05**. Similarly the adjustment coefficient related to D(KSE100_P) is -1.152584*, showing significant at 10% which validates the presence of a stable long run unidirectional relationship from D(Crudeoil_P) and D(KMI300_P) to D(KSE100_P). In this way, the ECT for the D(KMI30_P) is also found negative coefficient of -1.1987, showing insignificant.

4.5 Diagnostics Tests

The diagnostic tests confirm the validity of the results and the whole process of the modeling. The R Square and f statistics also signifies the results of the model and its authenticity. Moreover, LM test for serial correlation, Jarque-Berra test for normality and Heteroskedasticity test were performed to test the results of the model. The p value in each test has greater than 5%,

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meaning that there is no problem of serial correlation, abnormality and heteroscedasticity. The results of diagnostics tests are shown in table 4.5.1 in Annex-A.

4.6 Variance decomposition

Before estimating the variance decomposition, we need to perform unrestricted VAR models to examine any short run relationship among variables. Variance Decomposition helps us in predicting future forecasting in the way to determine that how much variation in the dependant is lagged by its own variance. It further analyzes that which independent variable is stronger in the ordering to have influence on the dependant variable in the model. Basically Var decomposition helps to interpret the VAR estimates. The tables 4.6.1, 4.6.2, and 4.6.3 have accumulated the results of variance decomposition obtained after performing unrestricted VAR model.

Table 4.6.1 Variance Decomposition of CRUDEOIL_P:

Period	S.E.	CRUDEOIL_P	KSE100_P	KMI30_P
1	2.620767	100.0000	0.000000	0.000000
2	3.539762	99.89346	0.069218	0.037319
3	4.264837	99.84679	0.072693	0.080522
4	4.865514	99.81910	0.067212	0.113683
5	5.385031	99.80031	0.058696	0.140999
6	5.845144	99.78562	0.050519	0.163858
7	6.259316	99.77283	0.044064	0.183108
8	6.636471	99.76080	0.039991	0.199207
9	6.982911	99.74891	0.038631	0.212463
10	7.303298	99.73673	0.040152	0.223116
11	7.601197	99.72398	0.044637	0.231383
12	7.879422	99.71041	0.052123	0.237471

Table.4.6.2 Variance Decomposition of KSE100_P:

Period	S.E.	CRUDEOIL_P	KSE100_P	KMI30_P
1	666.4481	0.377015	99.62299	0.000000
2	934.5314	0.397195	97.41437	2.188435
3	1151.241	0.406010	95.75689	3.837100
4	1334.998	0.425974	94.26980	5.304224
5	1497.722	0.439727	92.90755	6.652720
6	1645.563	0.449334	91.62752	7.923148
7	1782.212	0.455745	90.41488	9.129374
8	1910.030	0.459694	89.26386	10.27644
9	2030.616	0.461673	88.17214	11.36619

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10	2145.108	0.462040	87.13834	12.39962
11	2254.346	0.461073	86.16113	13.37780
12	2358.971	0.458989	85.23892	14.30209

Table 4.6.3 Variance Decomposition of KMI30_P:

Period	S.E.	CRUDEOIL_P	KSE100_P	KMI30_P
1	1347.954	0.065060	34.86972	65.06522
2	2068.300	1.139758	34.16585	64.69440
3	2600.779	1.483008	34.82807	63.68892
4	3024.954	1.643737	35.68386	62.67240
5	3380.160	1.724299	36.59637	61.67933
6	3687.704	1.766075	37.50930	60.72463
7	3960.220	1.786301	38.40167	59.81203
8	4205.810	1.793429	39.26421	58.94236
9	4430.003	1.792044	40.09287	58.11509
10	4636.759	1.784859	40.88612	57.32902
11	4829.015	1.773583	41.64378	56.58264
12	5009.018	1.759359	42.36640	55.87424

Cholesky Ordering: CRUDEOIL_P KSE100_P KMI30_P

In the Table 4.6.1, where the dependant variable is crude oil future contract in real price at WTI and the other explanatory variables embedded in the ordering model are KSE100 and KMI30 as proxies used for the stock market determinants under the present course of study. From the table 4.6.1, we can easily forecast that the variance in the oil prices is strongly endogenous by its own shock or innovation in the system in the beginning periods and later on as and when we move towards onwards, this response to the variation in the oil shock goes decreasing gradually (weak endogenity), summing up that adjustments made in the variation in the oil price at higher percent in the first period and then at lower percent in the upcoming periods. Similarly the variation in the crudeoil prices is strongly exogenous by KSE100 and KMI30 in the start means that stock market returns have small influence on the oil prices but later on Pakistan stock indices are weakly exogenous to the oil prices, meaning that both indices i.e. KSE100 and KMI30 have strong impact on the crudeoil future contracts.

In table 6.4.2, the variance decomposition in KSE100 by its own variance is 99.62299, 97.41437, 95.75689, 94.26980, 92.90755, 91.62752, 90.41488, 89.26386, 88.17214, 8 7.13834, 86.16113, and 85.23892 for the periods from 1 to 12. This state that the variation in KSE100 are strongly endogenous having more influence on KSE100 by itself in the first but then gradually goes down in the upcoming periods. This is because of the time periods in which stock market fitted towards shocks or innovations made in the system in the long run. At the same time

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the influence of others exogenous such as crudeoil and KMI30 have small on dependant variable (KSE100) in the first but after that it goes gradually high. All these are well shown in the table above.

Table 4.6.3 shows that the shock or impulse to the KMI30 due to the variation of the fluctuation in the KMI30 itself account for 65.06522, 64.69440, 63.68892, 62.67240, 61.67933, 60.72463, 59.81203, 58.94236, 58.11509, 57.32902, 56.58264, and 55.87424 for both short run and long run. This concludes that in the beginning the shocks are high and strongly endogenous but later on the shocks or volatility goes decreasing because of the fact that others independent variables have an influence on the dependant one. The exogenous effects on the Islamic index (KMI30) at Pakistan stock exchange are strong exogenous (small influence) due to the fluctuation and shocks in the variance of KSE100 and Crudeoil in the beginning weeks but later on its influence on KMI30 have stronger in the upcoming weeks.

On the basis of variance decomposition from the above tables we can easily forecast that in the short run the variations in the oil price because of its own variance are strongly endogenous while in long run it becomes weak. Further this shock to oil prices are strong exogenous (week influence) in the short run but in the long run it responds to KSE100 and KMI30 stronger. So it is concluded that the relationship between OIL market and stock market are stronger in the long run while this effect is weak in the short run.

4.7 Impulse Response Impulse response function is very important in empirical casual analysis and policy implications. It determines that how an endogenous variable responds to one of the shock or innovation in the system.

Response of CRUDEOIL_P:

Period	CRUDEOIL_P	KSE100_P	KMI30_P
1	2.599263	0.000000	0.000000
2	2.422107	0.036681	0.029661
3	2.891851	0.008189	0.101577
4	2.834523	0.029223	0.098211
5	2.926299	0.016596	0.095336
6	2.908209	0.021605	0.091063
7	2.925307	0.019797	0.089536
8	2.920389	0.021746	0.086568
9	2.923522	0.021892	0.084013
10	2.922042	0.022832	0.081494

Response of KSE100_P:

Period	CRUDEOIL_P	KSE100_P	KMI30_P
1	-39.83555	662.6207	0.000000
2	38.92331	634.5261	127.5414

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3	37.00134	700.5993	210.9033
4	74.07605	691.9197	230.0655
5	77.36631	689.6617	243.4778
6	85.81153	683.6721	260.5527
7	87.62100	680.0267	276.4240
8	91.14220	675.8872	290.3532
9	93.08230	672.2503	302.9946
10	95.23807	668.8081	314.7298

Response of KMI30_P:

Period	CRUDEOIL_P	KSE100_P	KMI30_P
1	27.65656	811.0913	1073.972
2	219.9338	935.3593	1247.492
3	309.6556	970.2533	1142.515
4	341.7302	964.7924	1094.097
5	343.4183	976.4167	1080.071
6	345.7747	984.7802	1059.854
7	344.0124	991.5313	1036.020
8	341.7428	997.2907	1014.422
9	338.6739	1002.921	995.1163
10	335.9153	1008.107	977.3086

Cholesky Ordering: CRUDEOIL_P KSE100_P KMI30_P

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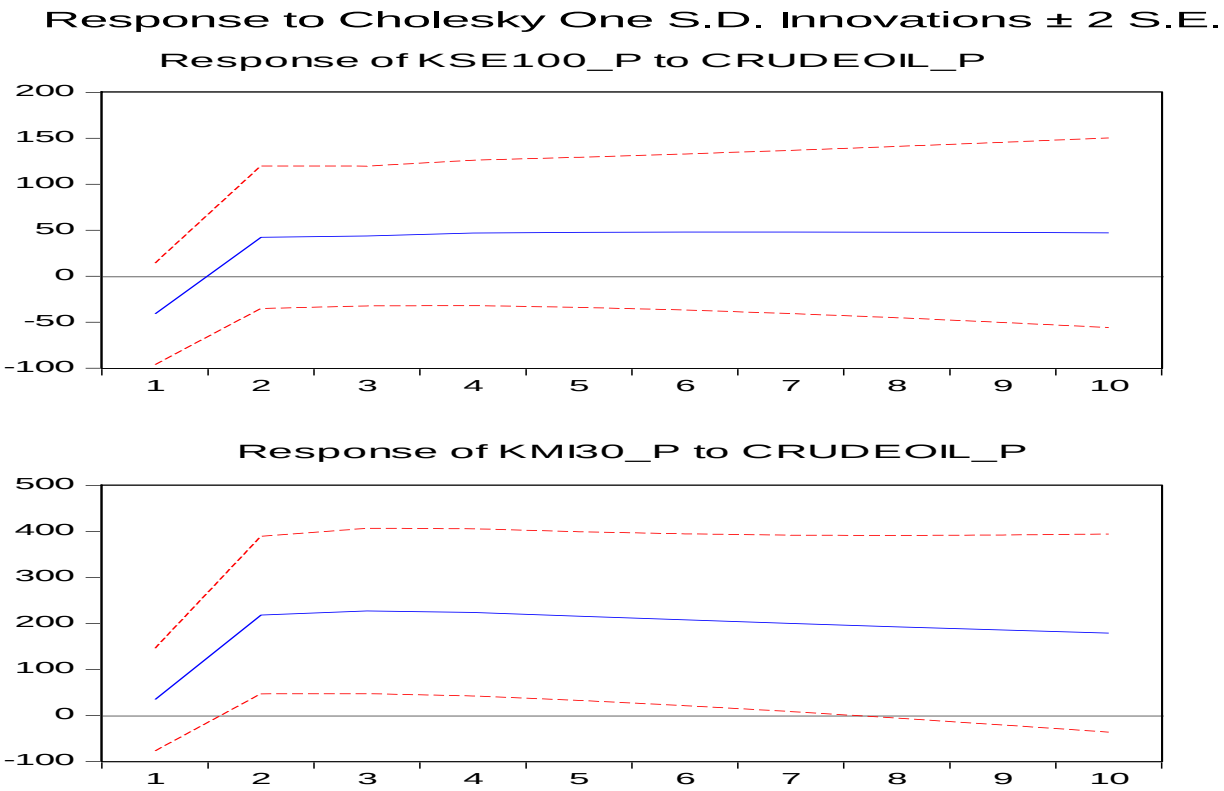

The above graphs show the impulse response function. In the first graph, the response of KSE100 to the one standard shock of crude oil future contracts in real time at international market has initially an increasing trend in the period 1 and 2. Then after the 2nd period, this response of KSE100 to the shock of crudeoil has almost constant trend. This means that in both short period and long run this response of KSE100 have a positive trend to the shocks of crudeoil.

Similarly in the second paragraph, the response of KMI30 to the crudeoil has been shown. The results is quite opposite from the previous one. Here one standard shock to the KMMI30 have an positive impact on the crudeoil prices in the beginning period let suppose in period 1 and 2. After that period, it starts gradually decline. So from the graph it is concluded that at the initial period the response of Islamic index market to the one standard deviation shock of oil market is showing positive trend but later on in the upcoming periods it gradually starts in decreasing trend.

5. Conclusion

The main objective of this study is to examine time-varying prorogation between the oil market and stock market. For this purpose crude oil future contracts in real time at World Texas Intermediate (WTI) was considered as proxy for oil marker determinant whereas the KSE100 and KMI30 were taken as stock market determinants at Pakistan Stock Exchange PSX. It has been observed by the researcher that crudeoil prices at international market and stock returns of KSE100 and MKI30 at Pakistan Stock Exchange PSX have very strong time-varying propagation and react to the spreads and fluctuations in the volatility. It has also been examined

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that both markets are highly cointegrated in the long run because of the strong trade and investment linkages. Investors are much conscious in the decision making to the spillover's effect. So it is concluded that volatility in the stock returns of kSE100 and KMI30 at PSX may be due to the transmissions of volatility in the oil market at WTI.

References:

Adam, C. (1992), "On the dynamic specification of money demand in Kenya" Journal of African Economies, 1(2), 233–270.

Anorou, E, & Ahmad, Y (2001) "Causal relationship between domestic savings and economic growth" Evidence from seven countries. African Development Review, 13(2), 238–249.

Arouri, M.E.H., Jouini, J. and Nguyen, D.K. (2011), "Volatility spillover between oil prices and stock sector returns": implications for portfolio management", Journal of International Money and Finance, Vol. 30 No. 7, pp. 1387-1405.

Aryeetey, E. (2004), "Financing Africa's future growth and development": Some innovations, Logon, Accra: ISSER, University of Ghana.

Benhabib, J. & Jovanovic, B. (1991), "Externalities and growth accounting": American Economic Review, 81(1), 82–113.

Blomstrom M., Lipsey, R., & Zejan, M. (1996), "Is fixed investment the key to economic growth"? Quarterly Journal of Economics, 111 (1), 269–276.

Brownbridge, M., Gockel, A. F., & Harrington, R. (2000), "Savings and investment".

Charles M. Jones and Gautam Kaul (1996), "Oil and the stock markets", the Journal of Finance, Vol. 1.1, No.2, June, 1996.

Ciner, C., Gurdgiev, C. and Lucey, B.M. (2013), "Hedges and safe havens: An examination of stocks, bonds, gold, oil and exchange rates", International Review of Financial Analysis, Vol. 29, pp. 202-211.

E. Aryeetey, J. Harrigan, & M. Nissanke (Eds.), "Economic reforms in Ghana, the miracle & mirage" (pp. 132–149). Accra: Wolli Publishing Services.

Bylik, V. (2006), "Financial innovation and the demand for money in Ukraine": Unpublished master's thesis, National University ''Kyiv-Mohyla Academy'', Kyiv.

Deaton, A. S. (1977), "Involuntary savings through unanticipated inflation": American Economic Review, 67, 899–910.

Derek, H. (2005), "Why personal savings rate might remain negative": RBC Economics retrieved from www.rbc.com/economics.

Dickey, D. A., & Fuller, W. A. (1979), "Distribution of the estimators for autoregressive time series with a unit root": In T. Mannah-Blankson & F. Belnye (Eds.), financial innovation and the demand for money in Ghana, (pp. 1–23). Accra: Bank of Ghana.

Enders, W. (1995), "Applied econometrics time series": New York, NY: Wiley and Sons.

Engle, R., & Granger, C. W. J. (1987), " Co-integration and error correction": Representation, Estimation and testing, in T. Mannah-Blankson & F. Belnye (Eds.).

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.390

Eze, E. (2001), "A critical examination of information technology strategic variables from developing countries' perspective": The case of banking industry, Journal of African Business, 2(3), 7–31.

Hans-Martin, B. (1994), "Ghana financial sector review: Bringing savers and investors together" (Report No. 13423-GH), retrieved from The World Bank Group website: http://www-wds.worldbank.org.

Haron, S. (2005). "Determinants of Islamic and conventional deposits in the Malaysian banking system": Managerial Finance, 34(9), 618–643.

Hammoudeh, S. and Yuan, Y. (2008), "Metal volatility in presence of oil and interest rate shocks", Energy Economics, Vol. 30 No. 2, pp. 606-620.

Horan, T. F. (1980), "Outlook for EFT technology in computer and banking: Electronic funds transfer systems and public": New York and London: Plenu Press.

Johansen, S. and Juselius, K. (1990), "Maximum likelihood estimation and inference on cointegration with applications to the demand for money": Oxford Bulletin of Economics and Statistics, Vol. 52 No. 2, pp. 169-210.

Kanjilal, K. and Ghosh, S. (2014), "Income and price elasticity of gold import demand in India": empirical evidence from threshold and ARDL bounds test cointegration", Resources Policy, Vol. 41, pp. 135-142.

King, R. G., & Levine, R. (1994), "Capital fundamentalism, economic development, and economic growth": Carnegie-Rochester Conference Series on Public Policy 40(1), 259–292.

Levine, R. (1997), "Financial development and economic growth, views and agenda": Journal of Economic Literature, 35(2), 688–726.

Mannah-Blankson, T., & Belnye, F. (2004), "Financial innovation and the demand for money in Ghana": Accra Bank of Ghana, Working Paper, 1–23.

Mavrotas, G., & Santillana, M. (1999), "Savings and financial sector development": Key issues, presented at the International Conference on Finance and Development, July 9–10, Manchester.

Mishra, P. K. (2008a), "Financial innovation and economic growth": A theoretical approach, Institute of Technical Education and Research (ITER), retrieved from papers.ssrn.com/so13/papers.cfm?abstract_id=1262658.

Mishra, P. K. (2008b), "Financial innovation in emerging markets-possible benefits and risks": Social Science Research Network, retrieved from http://ssrn.com/ abstract=1262650.

Ndekwu, E. C. (1991), "Interest rates, bank deposits and growth of the Nigerian economy": NISER Monograph Series 4, Ibadan: NISER.

Odularu, G. O., & Okunrinboye, O. A. (2008), "Modeling the impact of financial innovation on the demand for money in Nigeria. African Journal of Business Management, 3(2), 39–51.

Onyemaechi Joseph Onwe,(2012), "Economic implications of petroleum policies in Nigeria" An overview, American International Journal of Contemporary Research, vol. 2, No. 5; May 2012.

Oyelaran, Oyeyinka, B. (1991), "Information technology in finance sector: Adoption of computers in Nigeria banks": (research paper). Ibadan, Nigeria: NISER.

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.390

Parker, J. A. (1999), "Spendthrift in America, on two decades of decline in the U.S. saving rate": Retrieved from: pages.stern.nyu.edu/~dbackus/CA/Parker%20MA% 2099.pdf.

Montiel, P. J., & Luis, S. (2008), "Real exchange rates, saving and growth, is there a link"? (Working Paper No. 4636), Washington DC, World Bank Policy Research.

Roger D. Huang Ronald W. Masulis Hans R. Stoll (1996), "energy shocks and financial markets" , The journal of future markets, Vol. 16, No.1, pages 1-27 dated Feb., 1996.

Sadorsky, P. (2014), "Modeling volatility and correlations between emerging market stock prices and the prices of copper, oil and wheat": Energy Economics, Vol. 43, pp. 72-81.

Shabazz, D. (2000), "Electronic commerce: A new paradigm for the African business sector": Journal of African Business, 1(3), 29–47.

Sowa, N. K. (1997)., "Central banking and monetary management in Ghana": (Working Paper Series, 7, 1–23). Accra-North, Ghana: CEPA.

Tongco, M. D. C. (2007), "Purposive sampling as a tool for informant selection": Retrieved from http://hdl.handle.net/10125/227.

Tufano, P. (2002), "Financial innovation": A handbook of financial economics. Amsterdam, the Netherlands, Edward Elgar Publishing.

Tufano, P., & Schneider, D. (2008), "Using financial innovation to support savers": From coercion to excitement (Working Paper No. 08–075). Retrieved from:http://ssrn.com/abstract=1120382.112 A. Ansong et al.

Uremadu, S. O. (2007), "Core determinants of financial savings in Nigeria": An empirical analysis for National Monetary Policy Formulation. International Review of Business Research Papers, 3(3), 356–367.

Utkulu, U. (n.d.), "How to estimate long-run relationships in economics": An overview of recent developments. Retrieved from http://kisi.deu.tr/utku.utkulu/dosyalar/ How_to_estimate.DOC.

Vijay, K. B., & Camara, K. O. (2007), "Profitability, bank services, and use of computer technology in deposit money banks of Ghana": The Oguaa Journal of Social Science, 4(2), 94–95.

Yuan, K. C. (2007), "Modelling financial innovation and economic growth": Why the financial sector matters to the real economy. Journal of Education, 22(1), 33–37.