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The Impact of Oil Prices on ISE Indices

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Abstract: Changes in oil prices, which is one of the major inputs of industrial production has been identified in some surveys as having a significant impact on shares of industrial companies' prices. On the other hand, in the direction of stock prices reacting to changes in oil prices are also a widespread belief. From this point forth, the main aim of this chapter is to research the long-term relationship between oil-prices and ISE 100, ISE Electricity, ISE Industrials, ISE Chemical, Petroleum and plastic index. In this study, Granger co integration analyzes and Granger causality test will be applied to determine the relationship of time series.

Keywords: Oil Prices, Stock Prices, Stock Index, Co integration, Causality

1. Introduction

Energy is one of the basic inputs required for the development of a country. In the production process of economy activities, energy products create the greatest cost item. Social life, industry and transportation sectors suffer in the absence of inadequate energy. In this regard, energy prices for households and firms, as the same level for the politicians also, have been a source of interest for the financiers.

Primary energy consumption is composed in next order: % 33 of oil, % 24 of natural gas, % 30 of coal, % 4 of Nuclear energy, % 7 of Hydro-electricity and % 2 of renewable in 2013. Table 1 shows us the distribution of primary energy consumption in 2014. Utilization of energy resources is very similar to the distribution form the one shown in Table 1 presenting 2013 (BP, 2015).

Table 1: World Primary Energy Consumption (2014)

Region	Oil	Natural Gas	Coal	Nuclear Energy	Hydro-Electricity	Renew-ables	Total	Percent (%)
Total North America	1024.40	866.30	488.90	216.10	153.50	73.60	2822.60	22
Total S.& Cent. America	326.50	153.10	31.60	4.70	155.40	21.50	692.80	5
Total Europe & Eurasia	858.90	908.70	476.50	266.10	195.70	124.40	2830.30	22
Total Middle East	393.00	418.60	9.70	1.00	5.20	0.30	827.90	6
Total Africa	179.40	108.10	98.60	3.60	27.50	2.90	420.10	3
Total Asia Pacific	1428.90	610.70	2776.60	82.50	341.60	94.20	5334.60	41
Total World	**4211.10**	**3065.50**	**3881.80**	**574.00**	**879.00**	**316.90**	**12928.40**	
Percent (%)	**33**	**24**	**30**	**4**	**7**	**2**		

We can see the utilization of primary energy sources for the regions shows proportions of % 41 in Asia Pacific, % 23 in Europe & Eurasia, % 22 in North America, % 6, in Middle East, % 5 in S. & Cent. America, % 3 in Africa region in table 1. Looking at the results in table 2 for the distribution of the primary energy sources for the regions, there is conclusion that distribution in 2014 is similar to the distribution in 2013.

Oil is the largest share of the world consumption of primary energy resources in the period of 2013-2014. Coal (30%), natural gas (24%) have share of primary energy consumption. These three energy items' share of the world primary energy consumption is 87% of whole consumption.

Studying Turkey's primarily energy consumption for the last 30 years, it can be inferred that there is no change in consumption of hydro and coal energy. The dependence for oil can be decreased and there is a serious decrease in wood and waste energy source consumption. It is concluded that the dependence of natural gas has been rising rapidly for the last 20 years and the wind and solar energy have been expanding recently. However, over the last period of 30 years, it is determined that Turkey's structure on foreign energy-dependent did not change much (Doğaka, 2014). To reduce this dependence, the use of domestic resources should be expanded to maximum extent; the new energy fields should be identified; the use of new technology in using the energy efficiently should be promoted; new energy resources on the World should be discovered and the research for the country's potential should have priority.

According to BP statistics, in 2013, there is an increase of % 0.4 on annual basis to 122.8 million TEP that constitutes Turkey's domestic primary energy demand of which constitutes approximately % 1 of world demand. The largest share in the Turkey's primary energy demand is the natural gas with % 33. Petrol and coal come the second with the same portion of % 27. The share of hydro power % 11 and the share of renewable energy is only at the level of % 2.

In particular, the impact of oil prices on real economic activity, especially after the oil shocks in 1973, started to be the extremely important topic. Large number of researchers following Hamilton (1983) 's study, examined the impact of oil prices on economic activity. The impact of oil prices on the stock market first had been considered by Jones and Kaul (1996) and Huang (1996), the changes in oil prices in the postwar era of the US, Canada, Japan and Britain showed adverse effects on output and real stock returns. Huang et al. (1996) said that it will have a high level of correlation between changes in the stock and changes in oil prices, and according to his literature explaining the significant role of oil prices on the US economy. If the economy is an efficient market, oil and stock markets will move simultaneously and, the market prices of each stock and oil prices will react more promptly on market shocks. Jones and Kaul (1996) and Huang et al. (1996), by following the impact on stock prices and oil prices, carried out the numerous examined work.

Until today, the impact on developed and developing economic activity in studies of changes in the price of oil for those countries have been examined. The change in oil prices despite the existence of studies on the impact on economic activity appears to be less subject of study of the impact of oil prices on stock markets. The main aim of this study is to research the long-term relationship between oil-prices and ISE 100, ISE Electricity, ISE Industrials, ISE Chemical, Petroleum and plastic index. For this aim, Granger co integration analyzes and Granger causality test will be applied to determine the relationship of time series.

This study consists of five sections. The first part is about the definition and the importance of petroleum energy sources in economy and the interaction with the exchange stock markets together with its share both in Turkey and the World. The second part is literature section of the financial figures for the past 15 years, based on oil and academic studies which have been revealed the relationship with the stock market. In the third part of the study, data sets and methods of the study in the methodology section are described. In the fourth section of the study empirical outputs gathered by the chosen method are presented. In the fifth section of this study, the results are concluded.

2. Literature Review

Many studies are working to determine the relationship between stock indices and stock returns in energy prices, especially natural gas. However, studies in the literature are mainly aimed at identifying the impact of oil prices on stock prices. Looking at the finance literature about oil prices, there are many empirical studies revealing a relationship between macro economy and changes in oil prices.

Table 2: Related Literature

STUDY	PERIOD	COUNTRY	METHOD	RESULTS
Sadorsky (1999)	1947-1996	USA	VAR and GARCH	Oil price movements explain real stock returns
Papapetrau (2001)	1989-1999	Greece	VAR	Oil prices explain stock price movements.
Sadorsky (2003)	1986-2000	USA	ARCH	Oil prices have significant impacts on technology stock prices.
Maghyereh (2004)	1998-2004	22 Emerging Economies	VAR	Oil shocks have no distinct impact on stock index returns in these emerging economies.
Malik and Hammoudeh (2007)	1994-2001	USA, Saudi, Kuwait, Bahrain	GARCH	Oil market effects three gulf equity markets, US equity market affects three Gulf equity markets
Cong, Wei, Jiao and Fan (2008)	1996-2007	China	VAR	Shocks in oil price did not have meaningful effect on stock returns
Park and Ratti (2008)	1986-2005	U.S.A. and 13 European Countries	VAR	Oil price shocks effect stock markets of US and many European countries negatively, moreover rise of oil price effect the Norway stock exchange positively.
Miller and Ratti (2009)	1971-1999	OECD Countries	VECM	Stock exchange had responded negatively to the increase in oil prices in the long term.
Al-Fayoumi (2009)	1997-2008	Turkey, Tunisia and Jordan	VECM	Changing in oil prices don't have any effect on stock returns.
Eryiğit (2009)	2000-2008	Turkey	OLS	Oil price have a significant effect on ISE indices.
Arouri and Nguyen (2010)	1998-2008	European	GARCH	There is a strong linkages between oil price changes and stock markets
Arouri, Lahiani and Bellalah (2010)	2005-2008	GCC Countries	OLS	Oil price changes in Qatar, Oman, Saudi Arabia and UAE affect stock market returns, However, oil price changes in Bahrain and Kuwait don't affect stock market returns
Choi, Hammoudeh (2010)	1990-2006	USA	DCC-GARCH	There are a negative correlation between oil and stocks
Filis (2010)	1996-2008	Greece	VAR	oil prices affect stock market negatively.

Hacıhasanoğlu and Soytaş (2011)	2007-2011	USA	VAR	The existence of the relationship between oil and stock prices depend on various factors.
Lee and Chiou (2011)	1992-2008	USA	GARCH	Oil price volatility shocks have asymmetric effects on stock returns.
Ono (2011)	1999-2010	BRICs	VAR	Oil price affects stock return in China, India and Russia while doesn't affect stock return in Brazilian.
Kapusuzoglu (2011)	2000-2010	Turkey	Johansen Co-integration test, VECM	There was a long term relationship between oil price and XU100, XU050, XU030
Jammazi (2012)	1989-2007	USA, UK, Germany, Japan, Canada	ANN	Crude oil market shocks don't affect the stock markets in UK and Japan, while do affect the stock markets in USA, Germany and Canada.
Ünlü and Topçu (2012)	1990-2001	Turkey	Co integration, Causality	There is long term relationship and uni-directional causality running from oil prices to stock market
Güler and Nalın (2013)	1997-2012	Turkey	Co integration, Causality	Indices of ISE and oil prices series act together in long period, but there is no causality in short period.
Asteriou et al. (2013)	1988-2008	OPEC countries and 18 oil importing countries	VECM, Granger Causality	The interaction between the oil prices and the stock markets is strong in the short and in the long-run.
Asteriou and Bashmakova (2013)	1999-2007	CEECs	Panel Co-integration, OLS	Upward and downward movements of the oil market affect stock returns negatively.
Acaravcı and Reyhanoğlu (2013)	2001-2010	Turkey	Johansen Co-integration, VECM	There is a long-run relationship between XU100 index, industrial production index and oil prices
Abdioğlu and Değirmenci (2014)	2005-2015	Turkey	Granger causality	There is a strong evidence that the causation runs from stock prices to oil prices for many sectors.
Kaya and Binici (2014)	2002-2013	Turkey	Johansen Co-integration, Granger causality	There was a co-integration relationship between oil prices and ISE Chemical, Petroleum, Plastic index.

Many researchers investigated oil price's effects on stock markets and macroeconomic indicators. Table 2 contains national and international studies investigating the effect of oil prices on stock market indices. In some of the studies (Sadorsky (1999), Papapetrau (2001), Sadorsky (2003), Malik and Hammoudeh (2007), Park and Ratti (2008), Miller and Ratti (2009), Eryiğit (2009), Arouri and Nguyen (2010), Choi, Hammoudeh (2010), Filis (2010),

Jammazi (2012) etc.), oil prices have had an effect on stock market indices, while in others (Maghyereh (2004), Cong, Wei, Jiao and Fan (2008), Al-Fayoumi (2009), Arouri, Lahiani and Bellalah (2010), Ono (2011) etc.) , oil prices have not had any effect on stock market indices.

Kaya and Binici (2014) looked into their study, the relationship have been investigated between oil prices and stock prices of companies, which are operating in Turkey included in Istanbul Stock Exchange (ISE) Chemical, Petroleum, Plastics index that oil is the main production factors of these companies. For this purpose, whether there is a long-term relationship between ISE Chemical, Petroleum, Plastic index and oil prices, was tested with Jusellius Johansen co integration test. Granger Causality Test method was used to determine the direction of causality between variables. As a result of the analysis, co integration relationship was found between oil prices and ISE Chemical, Petroleum, Plastic index. In addition, a unidirectional causal relationship has been found from oil prices to ISE Chemical, Petroleum, Plastics index. Also in the present study, co-integration and causality tests have been applied by using daily closing values of ISE National 100 (XU100), ISE Electricity (XELKT), ISE Chemical Petrol Plastic (XKMYA), ISE Industrials (XUSIN), ISE All Shares (XUTUM) between years 1997-2015 and international Brent oil price in order to test the causality relationship between stock market in Turkey and international oil prices. This study searches the relationships between five fundamental index and international oil price, in this respect this study would make an important contribution to the field literature.

3. Research Methodology

This chapter focuses on the methodology of the study by the formulation of models with particular emphasis on the granger co integration and granger causality to capture effects of the oil price on ISE indices.

3.1 Data Set

Data set used in this study includes the period 01/02/1997-09/14/2015 and analyses have been studied by using 4664 observations on daily data basis. Closing data ($) pertaining to ISE National 100 (XU100), ISE Electricity (XELKT),ISE Chem. Petrol Plastic (XKMYA), ISE Industrials (XUSIN), ISE All Shares (XUTUM) Index have been obtained from Finnet Corporation Data Base. All index data obtained in terms of dollar from data base. Brent oil price data($) have been obtained from U.S. Energy Information Administration Data Base (http://www.eia.gov, http://datastore.borsaistanbul.com/). Microsoft Excel 2010 and E'views 8.0 package program were used to organize the data and implement the econometric analyzes.

3.2 Methods

Firstly, the natural logarithms of the data were taken before proceeding to the analysis process. Then, unit root analysis was performed for variables. Augmented Dickey-Fuller (ADF-1979) and Philips-Perron (PP-1988) test used for unit root test. Granger co integration test was used to investigate relationship among the variables. Finally, the Granger Causality test was applied to determine the direction of relationship between the variables

3.2.1 Unit Root Test

In time series analyzes, especially long-term studies conducted on stability analysis have been enhanced after 1980. In studies conducted until 1980s, analysis on models used at time series, were conducted after obtaining the difference of the variable of the models. Engle and Granger (1987) give a new breath to the literature about long-term relationships in their studies. Accordingly, all of the time-series involve trend and this situation causes no significant relationship between the variables "T" and "F" statistics and high value of R^2 while there is no relationship variables in regression analysis. This situation causes to be spurious regression problems in time series. Spurious regression makes it meaningless to analyze the

results. This situation is the cause of the test statistics become virtual an invalid (Charemza and Deadman, 1997). Therefore, main subject in time series is to determine whether stationary or not. Unit root testing is used to research stationary for the formal method.

The series containing unit roots are not stationary, they cause spurious regression. In this case, the results of the analysis do not reflect reality (Gujarati&Porter, 1999). Some problems arise in models that do not use some fixed time series, and a nonexistent relationship between variables is misinterpreted and judged as having existed. Several parametric and non-parametric tests were developed to find out whether a series is stationary or contains unit root.

Augmented Dickey-Fuller (ADF-1979) and Philip-Perron (PP-1988) test methods are famous to determine for the unit roots testing. The rejection or acceptance of the hypothesis H_o is determined by comparing the statistics obtained from the test to the critical value (Enders, 1995). The H_o hypothesis indicates that series are not stationary and has unit root. If the calculated value is greater than the absolute critical value, the H_o hypothesis is rejected and series is decided to be stationary.

H_0: Series is not stationary (There is unit root)
H_1: Series is stationary (There is no unit root)

The equations used in ADF

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^{m} \beta_1 \Delta Y_{t-i} + u_t \ (1)$$

The equation used in PP

$$\Delta Y_t = \alpha_0 + \alpha_1 (t - T/2) + \alpha_2 Y_{t-1} \sum_{i=1}^{m} \Delta Y_{t-i} + u_t \ (2)$$

Among the variables in the equations$\Delta Y_t = Y_t + Y_{t-1}$; t is the trend variable, stochastic error terms and T coefficient is the total number of observations.

3.2.2 Granger Co-Integration Test

Researchers look time series for stationary in order to prevent spurious regression. Even though there are many solutions for non-stationary time series, to wipe out the trend by taking the difference of the variables is a must. However, the realization of said process leads to the loss of long-term information and inhibit the long-term dynamic analysis. Engle and Granger (1987) who introduced literature co integration analysis, reveals that examining long-term relation in time series even if it is a trend (Utkulu, 1994).

If there is a co integration between variables, these variables include at least one directional causality (Utkulu,2003). When one or more than one no-stationary series has a mutual action in the long-term, it is called co integration.

There are there methods used to estimate the co integration between the variables in time series (Brooks, 2008).

1. Engle- Grangers Two Step Method
2. Engle and Yoos Three Phase Method
3. Johansen VAR Approach.

In this study we analyze the relation between variables by using two methods which is known as a single equation approach. Third method is, making without the distinction between dependent and independent variables, of the variables used in the determination of co integration relationship (Brooks, 2008).

According to the single equation approach, co integration relationship between variables is performed according to the first two methods. According to Engle and Granger (1987), even if the variables are non-stationary in the system but the linear combinations of these variables are stationary, there is a co integration between variables. So, there is needed to look each included variable's unit root tests.

If the variables are not stationary after testing by unit root test in level and the variables is stationary in first difference, using OLS methods can be applied to the variables. After the OLS results, the unit root testing is applied for residual. If the residual is stationary in level, the variables are co-integrated.

H_0: Residual Series is not stationary (There is no co integration)
H_1: Residual Series is stationary (There is a co integration)

Co integrated variables means that, among variables with long-term there is the presence of the joint movement. In case of co-variables, it means that integrated error correction mechanism (Error Correction Mechanism-ECM) occurs. If between the variables there is error correction mechanism, variables are co integrated at the same time and in the long term there is causality in at least one direction between these variables. The testing of causality between variables is done with Granger causality test Granger (1969). If Granger causality test is performed in non-stationary time series, it leads to false causality (Granger and Newbold, 1974; Stock and Watson, 1989). Because of that, the Granger causality tests are applied to stationary time series. If the result of the unit root tests is not stationary time series, by rendering inert causality test is applied on the first difference. The co integration of the variables mean that the variables have a long-term simultaneous movement. When there is a co integration result, ECM occurs If there is a ECM between the variables, the variables are co-integrated same level and there is at least one direction on causality.

Granger (1969) causality test is done for the testing of causality between variables. Granger causality test is not applied for non-stationary time series. Because non-stationary series cause the spurious regression (Granger and Newbold, 1974; Stock and Watson, 1989). Because of this reason Granger causality test is applied for stationary time series. If the time series is not stationary after unit root testing, first difference needs to be taken. Causality testing can be applied after converting this data.

3.2.3 Granger Causality Test

The Granger causality test is applied to determine the direction of relationship between variables (Granger, 1969). In the study, the Granger causality test was performed. The following model is predicted to determine the direction of causality:

$$Y_t = \alpha_0 + \sum_{i=1}^{k1} \alpha_i Y_{t-i} + \sum_{i=1}^{k2} \beta_i X_{t-i} + \varepsilon_t \quad (3)$$

$$X_t = x_0 + \sum_{i=1}^{k3} x_i X_{t-i} + \sum_{i=1}^{k4} \delta_i Y_{t-i} + v_t \quad (4)$$

In the models above, k shows the lag length and it is assumed that error terms are independent from each other (white noise) (Granger 1969).

4. Empirical Results

4.1. Descriptive Statistics Results

In Table 3, the basic statistical results of the variables used in the study are shown. The average values of variables were found to be oil price (57.025), ISE Electricity (3620.771),

ISE Chem. Petrol Plastic (15790.17), ISE National 100 (24304.99),ISE Industrials (20125.12), ISE All Shares (23851.13) , standard deviation values are found to be oil price (31.308), ISE Electricity (4786.726), ISE Chem. Petrol Plastic (6668.046), ISE National 100 (12286.98), ISE Industrials (10163.48), ISE All Shares (12258.35). When we look the skewness and kurtosis value for all variables, it can be said that variables are not distributed normally in especially ISE Electricity (XELKT), but other variables are distributed very close to normal distribution. It is desirable that the kurtosis value is 3 and the skewness value is 0 for the normal distribution. Following values were found: skewness value of Oil Price variable (0.301), kurtosis value (1.879), Jarque-Bera value(314.605); skewness value of ISE Electricity variable (2.623), kurtosis value (9.361), Jarque-Bera value (13212.24);skewness value of ISE Chem. Petrol Plastic variable (0.028), kurtosis value (1.825), Jarque-Bera value (268.617);skewness value of ISE National 100 variable (0.108), kurtosis value (1.756), Jarque-Bera value (309.770);skewness value of ISE Industrials variable (0.128), kurtosis value (1.620), Jarque-Bera value (382.723) and skewness value of ISE All Shares variable (0.112), kurtosis value (1.718), Jarque-Bera value (329.003).

Table 3: Descriptive Statistics Results

Observations Statistics/ Variables	OILPRC	XELKT	XKMYA	XU100	XUSIN	XUTUM
Mean	57.025	3620.771	15790.17	24304.99	20125.12	23851.13
Median	55.545	1699.713	15447.47	24885.94	19157.39	24179.43
Maximum	145.31	26444.73	32832.83	51069.86	40799.6	50389.11
Minimum	10.82	715.217	3892.491	4652.07	4419.721	4491.614
Std. Dev.	31.308	4786.726	6668.046	12286.98	10163.48	12258.35
Skewness	0.301	2.623	0.028	0.108	0.128	0.112
Kurtosis	1.879	9.361	1.825	1.756	1.620	1.718
Jarque-Bera	314.605	13212.24	268.617	309.770	382.723	329.003
Probability	0	0	0	0	0	0
Observations	4664	4664	4664	4664	4664	4664
Correlations						
OILPRC	1					
XELKT	-0.462	1				
XKMYA	0.752	-0.103	1			
XU100	0.832	-0.270	0.948	1		
XUSIN	0.860	-0.284	0.951	0.978	1	
XUTUM	0.840	-0.274	0.949	0.999	0.983	1

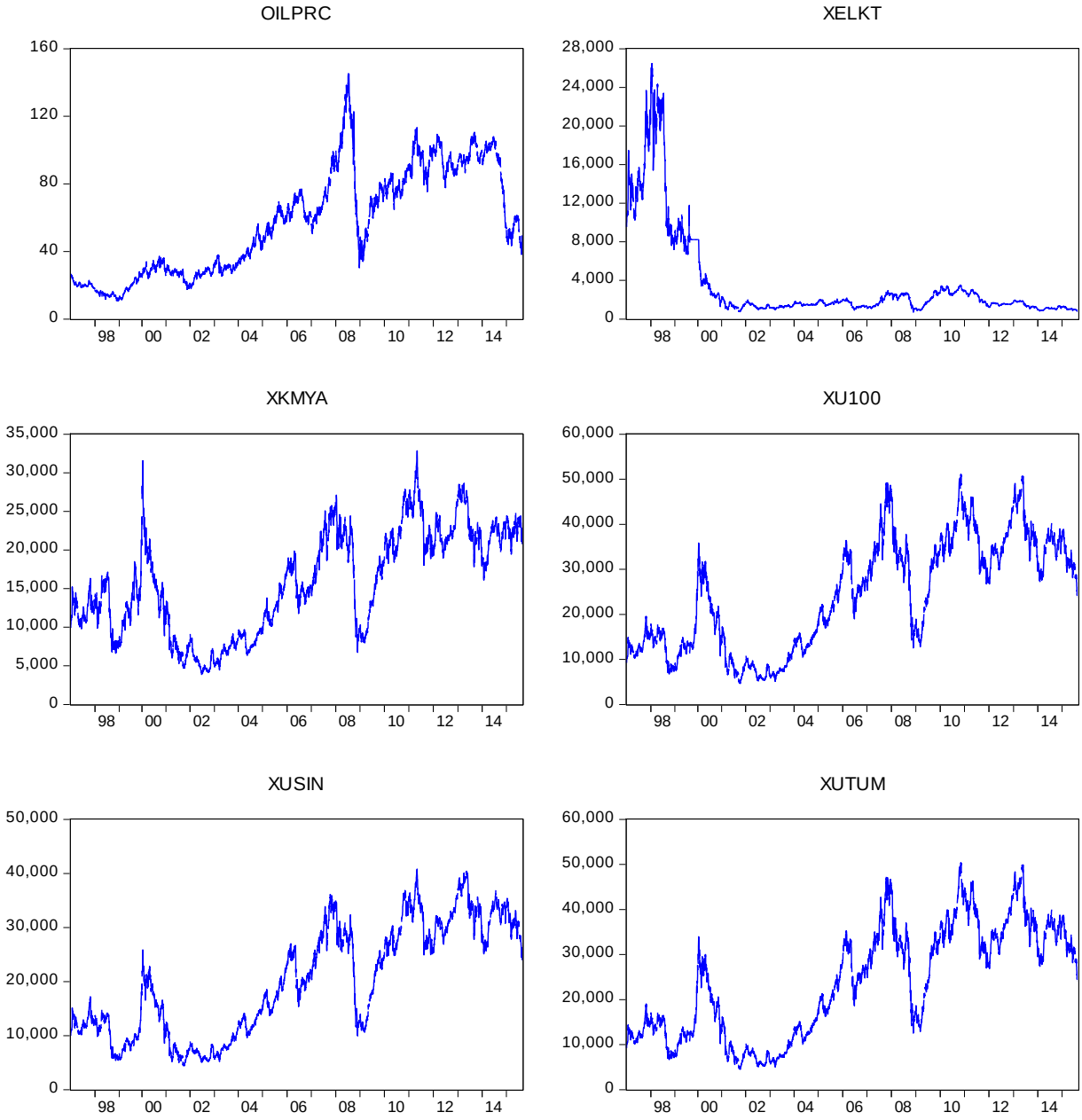
According to calculated values above; it has been found that oil price variable is skew (inclined) and oblate in the positive direction, ISE Electricity variable is skew (inclined) and sharp in positive direction, ISE Chem. Petrol Plastic, ISE National 100, ISE Industrials and ISE All Shares variables are skew (inclined) and oblate in the positive direction.

After analyzing correlation between oil prices (OILPRC) and ISE Electricity index (-0.462), a negative relationship is concluded. However, there is a positive correlation between high-grade oil prices and other variables. ISE of the Electricity index, except oil prices, has negative low correlation with all other variables. ISE Chem. Petroleum Plastic, ISE National 100, ISE Industrials, ISE All Shares are seen as positive high correlation between variables.

4.2. Unit Root Test Results

Before applying unit root test which analyze stability of time series, whether there is a trend or not can be looked for in the chart of time series. In the graph 1, time series are formed which belong to the whole variables.

Referring to graph 1, it cannot conclude easily that series are stationary in the level of value. However, when we look on the variable's time series charts, whether it is stationary or not cannot be determined sufficiently. The best way is to analyze the series for stationary or not by the test statistics.



Graph 1: All variables in time series

Unit root test can be use for series to determine stationary on level value. In the first step, it was looked whether variables are stationary in the level I(0). Then, ADF and PP tests were used in terms of 2 separate models being with constant and constant-trend.

Table 4 shows the results of the unit root test applied to the level values of the variables.

Table 4: Result of ADF,PP for Unit Root Test (Level Values)

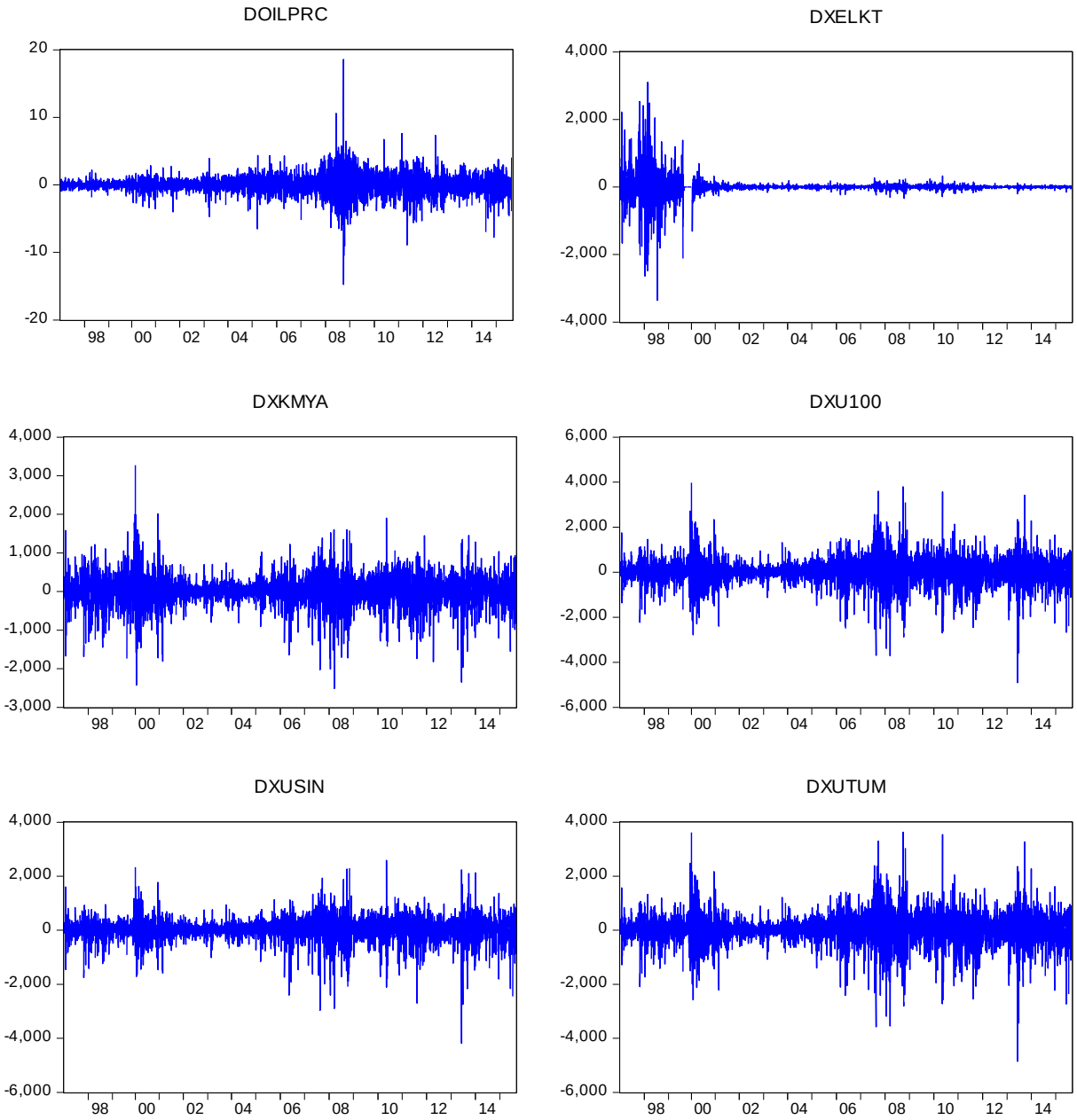
	ADF		PP	
	Constant	**Constant & Linear Trend**	**Constant**	**Constant and Trend**
OILPRC	-1.656	-1.833	-1.613	-1.728
	(0.452)	(0.688)	(0.475)	(0.738)
XELKT	-2.089	-2.257	-1.961	-2.211
	(0.249)	(0.456)	(0.304)	(0.482)
XKMYA	-2.265	-3.054	-2.256	-3.048
	(0.183)	(0.117)	(0.186)	(0.119)
XU100	-2.017	-2.418	-2.024	-2.323
	(0.279)	(0.369)	(0.276)	(0.421)
XUSIN	-1.732	-2.621	-1.744	-2.543
	(0.414)	(0.271)	(0.408)	(0.307)
XUTUM	-1.935	-2.365	-1.923	-2.267
	(0.316)	(0.397)	(0.321)	(0.451)

When Table 4 is examined, it is observed that all the variables in the ADF, PP tests are both stationary and unit roots in both models (constant and continuous tendency). If both variables are not stationary after unit root tests in I (0), the corresponding variables are made stable by taking the differences. Accordingly, I(1) ADF, PP unit root tests were repeated with the first differences in mind to make the variables constant, and the results are shown in Table 5.

Table 5: Result of ADF, PP for Unit Root Test (First Differences)

	ADF		**PP**	
	Constant	**Constant & Linear Trend**	**Constant**	**Constant and Trend**
OILPRC	-70.817	-70.819	-70.823	-70.827
	(0.0001)	(0.000)	(0.0001)	(0.000)
XELKT	-23.642	-23.645	-67.218	-67.212
	(0.000)	(0.000)	(0.0001)	(0.000)
XKMYA	-63.491	-63.483	-63.471	-63.464
	(0.0001)	(0.000)	(0.0001)	(0.000)
XU100	-64.472	-64.471	-64.485	-64.482
	(0.0001)	(0.000)	(0.0001)	(0.000)
XUSIN	-62.931	-62.926	-62.989	-62.984
	(0.0001)	(0.000)	(0.0001)	(0.000)
XUTUM	-64.352	-64.351	-64.388	-64.386
	(0.0001)	(0.000)	(0.0001)	(0.000)

In Table 5, The findings obtained with the ADF unit root test also support the results of the PP test. According to these results, since all the variables are integrated in the first order (1), the result is that there may be an integrated relation between the variables. For this reason, it is possible to deal with the issue irrespective of whether there is a long-term relationship between the oil price change and the ISE Electricity and the ISE Chemistry. Petrol Plastik, ISE National 100, ISE Industrial and ISE Stocks Variables.



Graph 2: All variables in time series after first difference

4.3. Granger Co integration Test Results

Stationary of each variable is provided after first difference operation for the variables. Regression equation of oil prices and the first level of stability for each independent variables were estimated by the OLS regression method. With using the ADF method from table 6 and PP method from table 7,the unit root test is applied to the residuals of the regression equation. According to the both unit root test results, it was concluded that the level of residual has been stationary. According to these results of the test, variables are co integrated.

Table 6: Result of ADF for Regression Residuals Unit Root Test (Level Values)

Dependent Variable	Independent Variable			Constant		Constant & Linear Trend	
				t-Statistic	Prob.*	t-Statistic	Prob.*
DXELKT	DOILPRC	ADF test statistic		-23.640	0.000	-23.643	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXKMYA	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		ADF test statistic		-64.056	0.000	-64.049	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXU100	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		ADF test statistic		-64.975	0.000	-64.971	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXUSIN	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		ADF test statistic		-63.720	0.000	-63.714	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXUTUM	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		ADF test statistic		-64.888	0.000	-64.885	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	

Table 7: Result of PP for Regression Residuals Unit Root Test (Level Values)

Dependent Variable	Independent Variable			Constant		Constant & Linear Trend	
				t-Statistic	Prob.*	t-Statistic	Prob.*
DXELKT	DOILPRC	PP test statistic		-67.231	0.000	-67.225	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXKMYA	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		PP test statistic		-64.030	0.000	-64.023	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXU100	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		PP test statistic		-64.989	0.000	-64.985	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXUSIN	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		PP test statistic		-63.773	0.000	-63.767	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	
DXUTUM	DOILPRC			t-Statistic	Prob.*	t-Statistic	Prob.*
		PP test statistic		-64.924	0.000	-64.909	0.000
		Test critical values	1% level	-3.432		-3.960	
			5% level	-2.862		-3.411	
			10% level	-2.567		-3.127	

With the information obtained from Table 6 and table 7, it has been concluded that the variables are co-integrated. It means that, there is a simultaneous long-term movement among the variables.

4.4. Granger Causality Test Results

Results of Granger Causality-Block Exogeneity Wald test performed based on Vector Error Correction Model(VECM) with the purpose of revealing whether there is a causality relationship between variables in each model, are shown in Table 8. By looking at Table 8, one will observe that only XUSIN(0.006) index are Granger cause in the 5% significance level of international oil price and international oil price (0.0294) is a Granger cause of only ISE Chem. Petrol Plastic index.

According to the obtained results, it can be said that ISE Electricity, ISE Chem. Petrol Plastic, ISE National 100 and ISE All Shares index have not causality relationship in the direction of international oil price. Also ISE Industrials index have one way causality relationship in the direction of international oil price. On the other hand International oil price have only one way causality relationship in the direction of ISE Chem. Petrol Plastic index.

Table 8: VAR Granger Causality - Block Exogeneity Wald Test Results

Models	Dependent	Independent	Chi-Square	Df	Prob.	Direction
1	DXELKT	DOILPRC	0.834	5	0.974	No Direction
	DOILPRC	DXELKT	0.299	5	0.9977	No Direction
2	DXKMYA	DOILPRC	12.422	5	0.0294	Indirection
	DOILPRC	DXKMYA	7.5222	5	0.1846	No Direction
3	DXU100	DOILPRC	8.793	5	0.1176	No Direction
	DOILPRC	DXU100	5.624	5	0.3445	No Direction
4	DXUSIN	DOILPRC	9.101	5	0.1051	No Direction
	DOILPRC	DXUSIN	16.015	5	0.006	Indirection
5	DXUTUM	DOILPRC	6.276	5	0.281	No Direction
	DOILPRC	DXUTUM	8.585	5	0.1268	No Direction

5. Conclusion and Recommendations

The possible relationship between oil prices and capital market, is thought to be the proper way of leading the investors to price the capital market instruments.

In this study, long term relationship and causality relationship between ISE Electricity, ISE Chem. Petrol Plastic, ISE National 100, ISE Industrials and ISE All Shares Index of Istanbul Stock Exchange (ISE) and international Brent oil price were examined by using econometric techniques for 1997-2015 periods. As a result of the analyzes made, it is observed that each stock market index is integrated with the international oil price. This result can be interpreted as related variables moving together in the long run. Considering the results obtained from the Granger causality analysis, it is found out that only the ISE Industrials stock index is the one-way causality relation to the international oil price and that the international oil price is only the ISE Chem. Petrol Plastic index reason. Findings obtained from co integration analysis show are line with results obtained from the studies of Maghyereh(2004) and Al-Fayoumi (2009) and Kapusuzoglu (2011).

According to the obtained results, oil prices in the long term are descriptive of ISE Chemical Petroleum Plastic index. So changes in oil prices have effects on the ISE Chemical Petroleum Plastic index. However, changes in oil prices don't affect ISE Electricity, ISE National 100 ISE Industrial and ISE's All Shares Indices.

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