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Petrol Fiyatlarının Borsa İstanbul'un Seçilmiş Endeksleri Üzerindeki Etkisi

ÖZET

Bazı yazarlar tarafından modern ekonomilerin can damarı olarak tanımlanan petrol endüstriyel üretimin büyümesiyle yakından ilgilidir. Literatürde petrol fiyatları ile makroekonomik aktivite arasındaki ilişkiyi inceleyen birçok çalışma olmasına rağmen, petrol fiyatları ile hisse senedi fiyatları arasındaki ilişkiyi inceleyen sayılı çalışma vardır. Bu çalışma söz konusu ilişkiyi sektör endeksleri (BIST-Mali, BIST-Teknoloji, BIST-Hizmetler ve BIST-Sinai) ve seçilmiş alt endeksler (BIST-Kimya Petrol Plastik ve BIST-Elektrik) kapsamında inceleyerek diğer çalışmalardan ayrılmaktadır. Seçilmiş alt endeksler petrolün girdi olarak kullanıldığı sektörleri temsil etmektedir.

Anahtar Kelimeler: Petrol Fiyatları, Sektör Endeksleri, Borsa İstanbul

Effect of Oil Prices on Selected Indices of Borsa Istanbul

ABSTRACT

Oil which is defined as lifeblood of modern economies by some authors is highly associated with growth in industrial production. Although there are many studies which examine the relationship between oil prices and macroeconomic activity, there is limited number of study examining the relationship between oil prices and stock markets. This paper attempts to differentiate itself by examining that relation from perspective of sector indices (BIST-Financial, BIST-Technology, BIST-Services and BIST-Industrial) and selected sub-sector indices (BIST-Chemical Petroleum Plastic and BIST-Electricity). Selected sub-sector indices represent industries where oil is used as input.

Key Words: Oil Prices, Sector Indices, Borsa Istanbul

JEL: D53



1. INTRODUCTION

Energy sources are important inputs for industrial production. The amount of energy that is used by modern society increases day by day. According to IEA (2015) it is especially true for oil which is defined as lifeblood of modern economies by some authors. Oil demand, which is correlated with growth in industrial production, is high in countries which experience rapid growth.

Hamilton (1983), which constitutes fundamental basis for subsequent studies which examine effect of oil price shocks on macroeconomic indicators, has found a statistically significant correlation between oil price change and gross national product growth. According to author oil shocks contribute in at least some of U.S. recessions prior to 1972. Mork (1986) has point out the fact that the period that is examined by Hamilton (1983) is the one when oil price movements are upward. Author has attempted to answer if correlation exists in the period of a decline and concluded that Hamilton's results continue to hold even when time period extended to include oil price decline which is experienced in 1986. According to Bernanke et al (1997), a more recent paper, during the period 1965-1996 recessions follow oil price shocks. Nonetheless authors mentioned from the fact that all of the U.S recessions during that period have been preceded by not only oil price increases but also a tightened monetary policy.

According to Berk and Aydoğan (2012) oil prices, which are the primary fuel of industrial activity, have a significant role on shaping countries' economic and political developments by affecting not only aggregate indicators but also companies' operational costs and revenues. Higher oil prices not only cause wealth transfer from oil consumers to producers but also affect consumer confidence unfavorably. According to Basher and Sadorsky (2006) rising oil prices act as an inflation tax on consumers and producers in two ways. Firstly it reduces disposable income of consumers which could be spent on other goods. Secondly it raises costs for non-oil producing companies whose profits fall unless they fully pass through these costs on consumers, their profits decrease in turn. Consistently according to Huang et al (1996) oil prices act as major determinant of production costs and affect firm profitability.

Oil price shocks could have differential effect on different countries depending on the industrial composition of the country, its relative position as an oil exporter or oil importer and differential tax structure. (Cunado and Gracia, 2003:138) Economies of oil-exporting countries may be affected from higher oil prices through wealth effect and negative trade effect. Higher oil prices lead to transfer of wealth from oil-importing countries to oil-exporting countries. If that income is used to purchase goods in exporting country, this will generate a higher level of activity in the economy which increases national wealth and demand simultaneously. Nonetheless according to Bjornland (2008) higher level of activity that is mentioned may put pressures on inflation and domestic currency, which often appreciate in oil-exporting countries. Moreover oil-exporting countries which not only export oil but also other commodities may be affected negatively through negative trade channel, since their oil-importing partners will decrease the amount of exported goods.

World meets its need of energy mostly from fossil sources. From fossil sources oil is the one that is mostly used. Developed economies use energy more efficient than they used to 20 years ago thanks to technological



innovation process they have experienced. However emerging countries are still more energy intensive compared to developed economies which cause them to suffer from rising oil prices. Consequently oil price changes affect profits and stock prices of emerging countries more than it does in developed countries. Since goods, services and capital are allowed to flow between national borders, effect of oil prices on emerging stock markets affect not only domestic but also international investors.

Based on equity pricing model equity prices are expected present value of discounted future cash flows. Oil, which constitutes one of important components of production with capital, labor and other materials, may affect cash flows of firms which use oil as input. Without complete substitution between factors of production, production costs increase which dampen cash flows and decrease stock prices of that company in turn. From another perspective rising oil prices put inflationary pressures and lead Central Banks to increase interest rate in an attempt to control inflation. Bonds become more attractive compared to stocks as interest rates increase. Furthermore interest rates affect discount rates directly in equity pricing formulation and cause stock prices to decrease.

Effect that is about issue changes depending on the industry examined. Since oil price shocks affect economy negatively and oil is used either direct or indirect input in many industries, one might expect oil prices to have negative impact on most industries except a few like oil producers and explorers. (Nandha and Faff, 2008:990) Although there are many studies that examine effect of oil prices on macroeconomic indicators, there is limited number of study that investigates effect of oil prices on stock markets. This study attempts to differentiate itself by examining mentioned effect from perspective of sector indices of Turkey.

1. Literature

El Sharif et al. (2005) has examined the relationship between crude oil price and equity values of oil and gas sector by using data of United Kingdom which is the largest oil producer in the European Union. Authors have shown that oil and gas companies' stock returns are affected by several risk factors including changes in crude oil prices, stock market as a whole and exchange rates. A rise in oil prices and equity market is found as increasing return on UK oil and gas equity index, whereas an increase in USD exchange rate is found as decreasing the return.

Basher and Sadorsky (2006) have investigated the relationship between energy prices and stock markets for 21 emerging markets including Turkey. According to results of that study oil price risk affects stock returns in emerging markets.

Bjornland (2008) has analyzed the effect of oil price shocks on stock returns of Norway which is an oil-exporting country. According to author oil prices have a stimulating effect on Norwegian economy which is possible for an oil-exporting country. Moreover results indicate that following a 10 % increase in the price of oil, stock returns increase 2-3 %. Finally Norwegian economy is found as responding higher oil prices by increasing its aggregate wealth and demand.

Nandha and Faff (2008) have examined if and to what extent adverse effect of oil price shocks affect stock market returns by using data of 35 DataStream global industry indices for the period April 1983-September 2005. At the end of the study oil price increases are found as having negative effect on equity returns for all sectors except for mining, oil and gas industries.

Kilian and Park (2009) has examined the effect of oil market shocks on stock markets by using data of Australia, Canada, France, Germany, Italy, Japan, United Kingdom and United States. In this study oil shocks are separated into three as oil supply shocks, global aggregate-demand shocks and idiosyncratic demand shocks. According to results oil-market structural shocks play a significant role in explaining the adjustments in stock market returns.

Filis (2010) has studied the relationship among consumer price index, industrial production, stock market and oil prices by using data of Greece for the period Jan1996-June2008. Findings indicate that oil prices and stock market affect CPI of Greece positively in the long run. Furthermore oil prices are found as having negative effect on stock market. Surprisingly it is stated that oil prices do not affect industrial production and CPI. Also no relationship is reported between industrial production and Greek stock market.

Cong et al (2008) have investigated the relationship between oil price shocks and Chinese stock market by using multivariate VAR. According to findings oil price shocks do not have a statistically significant impact on real stock returns of most Chinese stock market indices, but manufacturing index and some oil companies are accepted as exception. Some important oil price shocks are found as depressing oil company stock prices.

Wang et al (2013) have examined the relationship between oil prices and stock market by separating countries as oil-exporters and oil-importers. At the end of the study authors conclude that magnitude, duration and direction of response of a stock market to oil price shocks depends on if country is a net importer or exporter and if oil price changes are driven by supply or aggregate demand. Moreover effect of aggregate demand uncertainty is found stronger and more persistent for oil-exporters.

Çağlı et al (2014) have investigated the effects of US crude oil prices on some selected subsector indices of Borsa Istanbul. In this study where authors have employed VARFIMA model, daily data is used for the period 1997-2012. Results of the study indicate that oil prices and selected sub sector indices are significantly interconnected.

2. Data and Methodology

In the empirical part of this study the effect of oil prices on sector indices and some selected sub-sector indices of Borsa Istanbul is examined. Sector indices that are used include BIST-Financial (XUFIN), BIST-Industrials (XUIND), BIST-Technology (XUTECH) and BIST-Services (XUSER); whereas sub-sector indices that are examined include BIST-Chemical Petroleum Plastic (XUCHE) and BIST-Electricity (XU-ELC) indices. Monthly data is used for the period between 2004January and 2015December. Logarithms of selected indices are used as indices' returns. In the first place, unit root tests will be implemented.

Table. 1. Results of Unit Root Tests

	ADF		Philips Perron	
	Level	First Difference	Level	First Difference
XUFIN	n_u - 9.429874* [-2.880211]	-	n_u -9.455177* [-2.880211]	-
	η_t - 8.209350*	-	η_t -9.529359*	-



	[- 3.439461]		[-3.439267]	
XUIND	n_u - 5.333812* [-2.880591]	-	n_u - 9.104043* [-2.880211]	-
	η_τ - 5.418503* [-3.439857]	-	η_τ -9.094382* [-3.439267]	-
XUTEC	n_u - 9.206123* [-2.880211]	-	n_u -9.260720* [-2.880211]	-
	η_τ - 9.237808* [-3.439267]	-	η_τ -9.293808* [-3.439267]	-
XUSER	n_u -11.12771* [-2.880211]	-	n_u -11.16792* [-2.880211]	-
	η_τ - 11.31475* [-3.439267]	-	η_τ -11.30774* [-3.439267]	-
XUCHE	n_u - 11.49938* [-2.881830]	-	n_u -11.50770* [-2.881830]	-
	η_τ - 11.45760* [-3.441777]	-	η_τ -11.46641 [-3.441777]	-
OIL PRICES	n_u -2.944825** [-2.881978]	n_u -7.600301 [-2.881830]	n_u -2.455320 [-2.881685]	n_u -7.600301* [-2.881830]
	η_τ -2.717850 [-3.442006]	η_τ -7.708558 [-3.441777]	η_τ -2.049471 [-3.441552]	η_τ -7.666948* [-3.441777]

η_τ and η_μ refer to the test statistics with and without trend, respectively. * and ** denote rejection of null hypothesis at 1% and 5%, respectively. Numbers in brackets are Mckinnon critical values for % 5

As it is obvious in table 1 none of the indices have unit root based on not only ADF Test but also Philips Perron Test. In other words all indices are stationary. But although oil prices are stationary at level without trend based on ADF test, they are not stationary with trend. Moreover oil prices have unit root both with and without trend according to Philips Perron Test. Oil prices become stationary once first difference is taken. After implementation of unit root tests, Johansen cointegration test will be applied in an attempt to examine the long term relationship between oil prices and indices. The way how causality test is applied will be decided

depending on existence/nonexistence of cointegration relationship. Before implementation of cointegration test, appropriate lag number is determined according to Akaike information Criteria. After then stability condition, autocorrelation and heteroscedasticity will be tested. In table 2 appropriate lag numbers at which all conditions are met are given.

Table.2. Appropriate Lag Numbers

	BIST-Financial	BIST-Industrial	BIST-Technology	BIST-Services	BIST-Chemical Petroleum Plastic	BIST-Electricity
Lag Number	5	6	5	5	6	2

In table 3, results of Johansen Cointegration Test are given for all indices included.

Table.3.Johansen Cointegration Test Results

Hypothesized number of cointegrating equations	Trace Statistics	Critical Value (5 %)	Maximum Eigen Statistics	Critical Value (5 %)
BIST-Financial Index				
r=0	33.16572	15.49471	26.10822	14.26460
r≤1	7.057503	3.841466	7.057503	3.841466
BIST-Industrial Index				
r=0	30.03151	15.49471	23.13005	14.26460
r≤1	6.901464	3.841466	6.901464	3.841466
BIST-Technology Index				
r=0	31.14685	15.49471	24.26078	14.26460
r≤1	6.886071	3.841466	6.886071	3.841466
BIST-Services Index				



r=0	34.03963	15.49471	26.05264	14.26460
r≤1	7.986986	3.841466	7.986986	3.841466
BIST- Chemical Petroleum Plastic Index				
r=0	36.45271	15.49471	30.26615	14.26460
r≤1	6.186566	3.841466	6.186566	3.841466
BIST- Electricity Index				
r=0	64.00217	15.49471	57.29303	14.26460
r≤1	6.709136	3.841466	6.709136	3.841466

Based on Table 3, cointegration relationship exists between oil prices and BIST-financial index, BIST-Industrial index, BIST-Technology index, BIST-Services index, BIST-Chemical Petroleum Plastic index, BIST-Electricity index respectively. By this way existence of a long term relationship between oil prices and sector indices is proven. Due to fact that cointegration exists, Granger Causality test will be applied via Vector Error Correction model. Results of short term Granger Causality Test are given on table 4.

Table.4. Results of Short Term Granger Causality Test that is applied via VECM

Null Hypotheses	Test Statistics		
	Chi-square	Probability	Conclusion
BIST-Financial Index does not Granger Cause oil prices	3.169089	0.5299	Fail to reject Ho
Oil Prices does not Granger cause BIST-Financial Index	7.876591	0.0962	Fail to Reject Ho (at 5 %significance level)
Oil Prices does not Granger Cause BIST-	8.701637	0.1216	Fail to Reject Ho

Industrial Index			
BIST-Industrial Index does not Granger Cause oil prices	1.585726	0.9030	Fail to reject Ho
Oil Prices does not Granger Cause BIST- Technology Index	3.852332	0.4264	Fail to Reject Ho
BIST-Technology Index does not Granger Cause oil prices	0.789325	0.9399	Fail to Reject Ho
Oil Prices does not Granger Cause BIST- Services Index	4.107624	0.3916	Fail to reject Ho
BIST-Services Index does not Granger Cause oil prices	3.092413	0.5425	Fail to Reject Ho
Oil Prices does not Granger Cause BIST- Chemical Petroleum Plastic Index	32.03293	0.0000	Reject Ho
BIST-Chemical Petroleum Plastic Index does not Granger Cause oil prices	4.136068	0.5300	Fail to Reject Ho
Oil Prices does not Granger Cause BIST- Electricity Index	5.719408	0.0168	Reject Ho
BIST-Electricity Index does not Granger Cause oil prices	0.617154	0.4321	Fail to Reject Ho



Based on Table 4 there is not a causality relationship between oil prices and BIST- Financial index, BIST- Industrial Index, BIST-Technology Index, BIST-Services Index. However unidirectional causality is found from oil prices to indices of BIST-chemical petroleum plastic index and BIST-electricity index. Here it is noteworthy to specify that oil is used as input in these industries. Based on empirical analysis although a long term relationship exists between oil prices and all indices included in the analysis, causality relationship is detected only for industries where oil is used as input. Findings are in consistence with expectation.

CONCLUSION

Generally emerging markets are more energy intensive compared to developed markets. That case make emerging markets vulnerable to oil prices. This study is essential since it is one of the rare studies which examine the relationship between oil prices and industrial indices. By the indices used relation about issue is examined by comparing industries which use oil as input and others that do not use oil as input. At the end of the empirical study co integration relation is detected between oil prices and all indices. Nonetheless causality relationship is detected only for industries where oil is used as input. This finding is consistent with expectation. In further studies same relation could be investigated by using data set of both oil-exporting countries and oil-importing countries and results could be given comparatively.

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