Research Article

The Impact of Petrol Prices on Stock Prices of Energy Companies: A Panel Data Analysis for Turkey

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Abstract

The aim of this paper is to analyze the impact of petrol prices on the stock prices of energy companies traded in Istanbul Stock Exchange. To achieve this objective, daily panel data for 9 energy companies are examined for the period between 01/02/2008 and 02/26/2016. For the estimations, random effects and fixed effects panel data estimation methods are used. According to the results, changes in petrol prices effects stock prices of energy companies, negatively. Interest rates and M2 money supply affect stock prices of the energy companies, negatively. In addition to the macro variables, ROA and capital growth are the micro variables affecting stock prices of energy companies.

Keywords: Petrol Prices, Stock Prices, Panel Data Analysis, Turkey

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1.   Introduction

(The share of petrol consumption in energy sources has been decreased from 35.96% to 32.94% from 2005 to 2015. Yet, petrol is still the most important source of energy followed by coal (29.20%) and gas (23.85) by 2015 (World Energy Council, 2016). Petrol prices is important since the production in all sectors depend on energy, and petrol is the primary resource in energy production. Increasing petrol prices cause the cost of production to increase in petrol importing countries while decreasing petrol prices cause vice versa. Increasing/decreasing input prices cause the prices of final goods to increase/decrease. An increase in the input prices might also cause inflationary problems due to the increases in the prices of final goods (Sadorsky, 1999)

Cost of production is not the only thing that is affected from petrol trade. There is a continuous money inflow to the petrol exporting countries from petrol importing countries which causes foreign exchange rates of the petrol importing countries to increase. To deal with this problem, central banks of petrol importing countries increase the interest rates which lead economic actors to change the direction of their investments from stocks to government bonds and bills. This situation causes the stock prices to fall.

Petrol prices is also important for petrol importing countries' international competition. A change in the petrol prices will impact the production cost of the manufacturing companies which are also exporting. This situation has an impact on the international competition power of the manufacturing companies. That is also affecting the stock prices of these foreign trade market competitors. Moreover, theoretically, an increase in oil prices will affect the economic indicators of oil importing countries. It has a negative impact on balance of payments account while the price of exported goods declines as the value of exported goods declines and the national income decreases.

Energy is important for the growth and development of countries and is influential on many sectors, especially the industrial sector. As a direct input, a change in price of energy changes the cost of production. Particularly, a change in petrol prices not only affects the financial markets of the countries but also the stock prices. Economic units, which consider oil as an investment instrument, closely follow oil prices while making investment decisions. The reason for the negative effect of the increase in oil prices on the stock prices is attributed to the fact that petroleum-consuming companies are more than petroleum-producing companies in the world.

Turkey meets a large majority of its oil needs with imports. Turkey therefore, is a sensitive country to oil prices fluctuations. The aim of this study is to find out if there is a significant impact of the petrol prices on energy companies in Turkey.

In the literature, there are no particular study for Turkish data which empirically examines the impact of petrol prices on the stock prices of companies operates in one-particular sector: Energy. Since the changes in petrol price have a direct impact on energy sector companies and there are not enough studies examined the Turkish case from this aspect, it is believed that this study will represent a valuable contribution to the existing literature.

The organization of this paper is as follows: After section 1, section 2 gives the empirical literature about the determinants of stock prices and the impact of petrol prices on stock prices. Section 3 gives information about the data, the models used and finally analysis results. Section 4 gives the conclusion.

2.   Literature Review

There are bunch of empirical studies in the literature related to this study. Some of them focused on the determinants of the stock prices while some of them on the impact of petrol prices on stock prices. However, the studies examined the impact of petrol prices on stock prices are limited especially for Turkey. There are some studies tried to find out the impact of petrol prices on stock prices for Turkey but none of them focused on companies operate in a particular sector.

Malliaris & Urrutia (1992) pointed out the simultaneous stock price fall in several stock markets after the increasing petrol prices after Gulf crisis. This is one of the very first evidences on the impact of oil price shocks on stock prices in the literature. Jones and Kaul (1996) found that the change in petrol prices have negative effects on output and real stock returns for the US, UK, Canada, and Japan economies using the standard cash flow/dividend valuation model. Sadorsky (1999) noted that the increase in petrol prices has affected the stock market in the negative direction, and he pointed out that volatility in petrol prices is one of the determinants of the stock market. According to the vector autoregression results, a positive oil shock tends to have a depressing impact on both industrial production and stock returns. Park and Ratti (2008) and Basher and Sadorsky (2006) concluded the same results with Sadorsky (1999). However, according to Apergis and Miller (2009), the impact is low. Le and Chang (2011) also indicated that the impact of the petrol price changes varies among different stock markets in different countries. Cong et al. (2008) examined the impact of petrol prices on stock prices for China using the VAR model. As a result of the study, petrol price shocks have no significant impact on China's stock market indices. In contrast with the results of Cong et al., Chittedi (2012) found a significant impact of the petrol prices on stock prices for India. Acaravcı (2013) supported this result by using error correction model for Turkey's BIST100 (Borsa Istanbul) index and petrol prices. According to the results, there is a long-term relationship between BIST100 index and petrol prices. Kapusuzoğlu (2011) concluded the same. Abdioğlu and Değirmenci (2014) found a two-way causality between petrol prices and stock returns. Zortuk and Bayrak (2016) indicated the cointegration between stock prices and petrol prices. Wang et.al. (2013) analyzed the impact of the petrol price volatility on stock prices using VAR model. They found. they found that the volatility has a negative impact on stock prices. Narayan and Narayan (2010) found a positive impact of petrol prices on stock prices for Vietnam.

Table 1. Literature Review

Author, Year	Method	Results
Malliaris & Urrutia, 1992	Granger Causality	1987 Oil Crisis hit most of the stock markets, simultaneously.
Jones & Kaul, 1996	Regression	The reaction of US and Canada's stock prices to the changes in petrol prices are highly depended on cash flow.
Sadorsky, 1999	VAR Model	Volatility has a negative impact on stock returns.
Demir, 2001	Regression	Leverage rate, market to book value, returns on capital, returns on equity and profit growth are the factors determining stock prices.
Lanza *et al.* 2005	VAR Model	An increase in the exchange rates leads to a decrease in the stock values of non-US companies.
Bahser & Sadorsky, 2006	International Multi-Factor Model	Petrol prices affects the stock prices in developing countries.
Park & Ratti, 2008	VAR Model	There is a statistically significant impact of petrol price shocks on stock returns.
Cong *et al.* 2008	VAR Model	There is no significant impact of petrol price shocks on China stock market indices.
Apergis & Miller, 2009	VAR Model	The reaction of stock returns to the changes in petrol prices is low.
Narayan & Narayan, 2010	Error Correction Model	Exchange rates and oil prices have a positive impact on stock prices of Vietnam.
Albeni & Demir, 2011	Regression	Gold prices, interest rates and exchange rate of German Mark affect stock prices in Germany.
Kapusuzoglu, 2011	Johansen Cointegration & Granger Causality	There is a long-term relationship between Borsa Istanbul 100, 50 and 30 indices and petrol prices.
Le & Chang, 2011	VAR Model	The impact of a change in the petrol prices on stock prices changes from one country to another.
Nishat, 2011	GMM	Interest rate, M2 money supply, market to book value and capital structure has a significant impact on stock prices in Pakistan.
Chittedi, 2012	ARDL Model	Changes in petrol prices has a significant impact on stock prices in India.
Acaravcı, 2013	Error Correction Model	There is long-term relationship between BIST 100 index, petrol prices and industrial production index.
Aktaş & Akdağ, 2013	Regression	Interest rates, consumer price index, exchange rates, capacity utilization rate and consumer confidence index affects BIST 100 index.
Wang *et al.* 2013	VAR	Volatility of the petrol prices has a negative impact on stock prices.
Abdioğlu & Değirmenci, 2014	Granger Causality	There is a two-way causality relationship between petrol prices and stock returns.
Zortuk & Bayrak, 2016	Cointegration	There is a cointegration between petrol prices and stock prices.

Source: *Authors*

3.   Data, Model and Analysis Results

a.   Data

There are four data sources used to construct our daily panel data for our estimations; Central Bank of the Republic of Turkey, Turkey's Public Disclosure Platform, Metastock and Macrotrends. Our panel data consists of 9 firms "AKENERJI Electric Production Inc.", "AKSA Energy Production Inc.", "AKSU Energy and Trade Inc.", "AYEN Energy Inc.", "AYGAZ Inc.", "PETKIM Petrochemical Holding Inc.", "TURCAS Petroleum Inc.",

"TÜPRAŞ-Turkish Petroleum Refineries Inc." and "ZORLU Energy Electricity Production Inc.". Our time period contains 2053 days between 01.02.2008 and 02.26.2016.

In order to calculate the financial ratios, we used income statements and balance sheets of the firms in the energy sector from Public Disclosure Platform. We used daily Metastock data for the stock prices and Macrotrends data for daily petrol prices. Lastly, we used the Electronic Data Delivery System (EEDS) of Central Bank of the Republic of Turkey for the rest of macroeconomic variables i.e. "interest rate, gold price, money supply and USD/TL ratio".

3.2. Model

In our estimations, we used the following econometric model to identify the determinants of energy companies' stock prices:

$$P_{it} = \beta_0 + \beta_1 PP_{it} + \beta_2 USD_{it} + \beta_3 I_{it} + \beta_4 GP_{it} + \beta_5 LR_{it} + \beta_6 MBV_{it} + \beta_7 ROA_{it} + \beta_8 CG_{it} + \beta_9 PG_{it} + \beta_{10} YD + \varepsilon_{it} \tag{1}$$

Where P_{it} represents the stock prices, PP_{it} petrol prices, USD_{it} Dollar/TL ratio, I_{it} interest rate, GP_{it} gold prices, LR_{it} leverage ratio, MBV_{it} market to book value, $;ROA_{it}$ returns on assets, CG_{it} capital growth rate, PG_{it} profit growth rate, YD dummy variable for years. Additionally, *i* and *t* indicate firm and time, respectively.

Stock price and the petrol price (per barrel) are measured as logarithm of the stock price and the barrel petrol price. Interest rate is the Istanbul Stock Exchange Market (BIST) interbank overnight REPO interest rate. Gold price is the logarithm of the daily weighted average gold price (KG) and M2 is percentage change in the weekly M2 money supply. Dollar/TL is taken as it is and the other variables are calculated from firms' balance sheets and income statements.

3.3. Analysis Results

We used both random effects and fixed effects models in our analysis. In both fixed − effects model and the random effects model, we used year dummies to see the time effects. However, the most reliable analysis result is the random effects result because the data is firm level (Baltagi, 2008). Yet, we applied the Hausman test for model selection between random effects and fixed effects models. We do not reject the null hypothesis that the random effects model is consistent. Nevertheless, we have the same results for both random effects and fixed effects models.

Table 2 gives the estimation results. According to our estimation results, obviously, an increase in petrol prices affects Turkish energy firms' stock prices negatively. This result is significant in both random − effects and fixed − effects models. Considering the aspects that petrol as the most important raw material for energy companies and they are petrol importing companies, this result is quite meaningful. BIST interbank overnight REPO interest rate also has a negative impact on energy sector stock prices in BIST Istanbul. This result shows that demand for stocks falls as interest rate rises. Both the fixed effects model and the random effects model support this claim. Exchange rate of Dollar/TRY is not statistically significant. Book to market value is statistically significant and positive in both fixed − effect and random − effect models. Accordingly, when the ratio of market/book value increases, it has a positive impact on stock prices. Return on assets (ROA) and Capital growth rate are also positive and statistically significant in both random − effects and fixed − effects models. However, M2 money supply is not significant for neither fixed nor random effects model.

Table 2. Estimation Results

Dependent Variable: Stock Prices		
Independent Variables	FE	RE
ln petrol price	-0.410**	-0.410***
	(0.129)	(0.129)
Interest rate	-0.0269***	-0.0269***
	(0.00674)	(0.00673)
Dollar/TRY	-0.268	-0.268
	(0.166)	(0.166)
M2	-0.00326	-0.00326
	(0.00214)	(0.00214)
ln gold	-0.132	-0.132
	(0.108)	(0.108)
Leverage	0.281	0.280
	(0.566)	(0.562)
Market to book value	0.00117*	0.00117**
	(0.000564)	(0.000562)
ROA	1.310**	1.311***
	(0.497)	(0.498)
Capital growth	0.00185**	0.00185**
	(0.000761)	(0.000761)
Profit growth	0.00120	0.00120
	(0.00510)	(0.00510)
Years	included	included
Constant	6.815**	6.829***
	(2.481)	(2.302)
Observations	10,576	10,576
R-squared	0.256	
Number of firms	9	9

Robust standard errors in parentheses

(*** $p<0.01$, ** $p<0.05$, * $p<0.1$)

4.   Conclusion

In this study, we aimed to find out what is the impact of the petrol prices on energy companies' stock prices. We used random and fixed effect panel data regression models for our analysis. We analyzed the data of 9 energy sector companies of Turkey's Borsa Istanbul (a.k.a. Istanbul Stock Exchange) for the period 2008-2016.

For the selected sample, petrol prices affect the stock prices of energy companies, negatively as expected. In addition to the petrol prices, interest rates, M2 money supply, ROA and capital growth are the variables affecting the stock prices of 9 energy companies of Turkey's Borsa Istanbul. In particular, interest rate negatively affects the stock prices while ROA, market to book value and capital growth of the companies has a significant positive impact on stock prices.

Countries like Turkey (highly depended on the foreign resources for energy), obviously, will be affected from the petrol prices shocks. To reduce the impact, they should decrease their dependency on foreign resources. Using renewable energy resources would be one of the most effective solutions for this problem.

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