Oil Price Shocks and Sub-sector Performance of Turkey: Impact of Dominant Markets

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Abstract

Most of the studies regarding the effects of oil price shocks on financial markets have revolved around developed countries such as the United States and west European countries. These countries are not only large but, consequently, influential on the overall performance of financial institutions around the world. Turkey has always been considered a unique country not only because of its geographical location, but also its dynamically changing economic structure. Especially recently, significant amounts of foreign capital have been flowing into the Turkish financial sector. For investors, understanding the inner dynamics of a foreign economy is crucial in minimizing risk. This study intends to find the relationship between oil price shocks and industry sub-sectors of the Istanbul Stock Exchange in light of performance of the US stock market. Our study has shown that oil price shocks significantly impact some sectors while others are more driven by fluctuations of US stock market. While some of our findings were similar to previous research, others were significantly different.

1 Introduction

Prices of energy commodities, without question, have significant effects on economies around the world. Although this impact varies from country to country, previous research has shown the reaction of financial sectors to differ even within the same financial structure. As population in the world increases, the amount of energy required to satisfy the needs of people goes up. In addition, nations which previously were not consuming as much energy are emerging as major energy consumers. Fossil energy, being strictly a scarce resource, bears the highest burden of the increased demand.

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The most predominant fossil energy source is oil. As explorations of new reserves are on the way, the pressure on current reserves makes this commodity an important one for policy makers and investors. It is expected that each nation's economy react differently to outside price impacts. While some nation's industry can be a significant energy consumer, other's might be less involved in the energy sector. Aside from the general economic impacts, stock markets typically might give different reactions to different outside shocks as well.

Turkey, being a rapidly developing country, has gotten its place on the wagon of heavy oil consumption. The figures below show, as of January 1, 2009, Turkey ranked 23rd on the overall world oil consumption rankings (see Figures 1.2 and 1.3).

Rank Country	Oil - consumption (bbl/day)
1 United States	20,800,000
2 China	6,930,000
3 Japan	5,353,000
4 Russia	2,916,000
5 Germany	2,618,000
6 India	2,438,000
7 Canada	2,290,000
8 Korea, South	2,130,000
9 Brazil	2,100,000
10 Mexico	2,078,000
11 Saudi Arabia	2,000,000
12 France	1,999,000
13 United Kingdom	1,820,000
14 Italy	1,732,000
15 Iran	1,630,000
16 Spain	1,600,000
17 Indonesia	1,100,000
18 Netherlands	1,011,000
19 Thailand	929,000
20 Australia	903,200
21 Taiwan	816,700
22 Singapore	802,000
23 Turkey	660,800

Figure 1.2: Ranking of World countries according to their oil consumption
Source: CIA World Fact Book
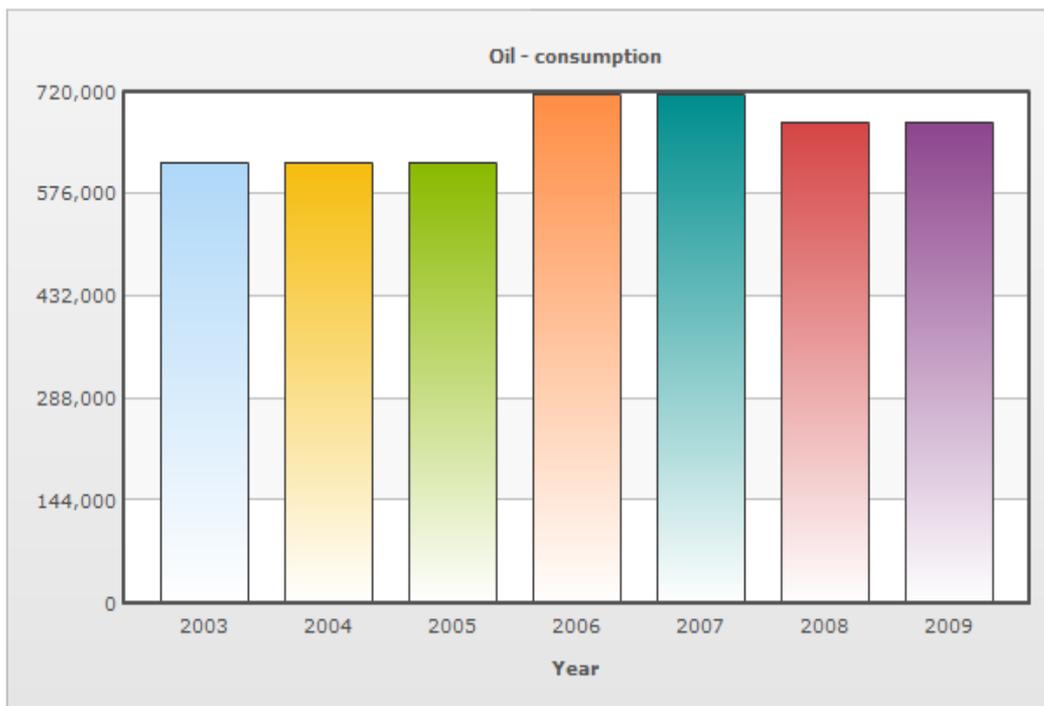
Figure 1.3: Turkey's oil consumption per thousand barrels.
Source: CIA World Fact Book

The purpose of this study is to look at the oil price shock effects on sub-sector indexes of the Turkish stock market. Although a similar study was conducted by Eryigit (2009), this paper extends earlier work by incorporating the role of US market in the Turkey/oil relationship and increasing the data span.

2 Literature

A large amount of research has been conducted analyzing the relationship between oil prices and economic indicators. Most research has concentrated on the effects of crude oil prices and macroeconomic indicators such as GDP and GNP and the channels that these oil prices affect those indicators (Brown and Yucel, 2002).

Cunado and Perez (2005) concluded that a rise in oil prices could reflect positively on inflation in some Asian countries. Uri and Boyd (1997) found that, in Mexico, oil price shocks have a decreasing effect on people's investment and consumption.

Changes in expected returns and cash flows due to oil shocks were studied by Jones and Gautam (1996). Their study looked at five developed economies and found that there is a significant relationship between shocks to the oil market and stock markets of the nations they tested. Their conclusion was that the real stock returns of developed nations were sensitive to major oil price fluctuations.

When looked at from an import/export point of view, Park and Ratti (2008) showed that the stock markets for countries which were net-importers of oil got negatively impacted

while the opposite was true for net-exporters, when they examined the US and 13 European countries.

Faff and Brailsford (1999) tested the impact of oil prices on the different sectors of the Australian stock market. Their findings showed that different sub-sectors within the stock market gave different responses to oil prices. The results suggested that industries which were diversified in their resources gave positive reactions to shocks, but the same was not true for others such as the transportation industry.

Eryigit (2009) followed the methodology of Faff and Brailsford (1999) and tested the Turkish stock market. Although Eryigit's paper follows a similar line of research to ours, some the results of this paper are different. Aside from the effects of US market, which were not analyzed in that paper, our study shows contradicting results; especially in the transportation sector.

3 Data

The sub-sector index (Banks, Electricity, Leasing/Factoring, Food/Beverages, Holdings/Investment, Wood/Paper/Printing, Chemical Petroleum Plastics, Metals, Metal Products/Machinery, Non-metal Products, Retail, Textile/Leather, Tourism, Transportation, Real Estate Inv. Trusts) as well as the ISE-100 daily values were collected from http://www.ise.org. For the daily oil prices, values from http://www.eia.doe.gov/ were used. S&P 500 values were gathered from www.standardandpoors.com . Exchange rate values were collected from http://www.oanda.com/convert/fxhistory.

In order to have a true comparison for testing the model with and without S&P 500 values (controlling for US effects), the data span of the first part of this study is consistent with Eryigit's (2009) paper: January 4th 2000 – January 11th 2008.

In order to confirm our findings we expanded the data set in the second part of the paper to April 12th 2011.

4 Methodology

This study first uses the OLS approach to an extended market model as developed by Faff and Brailsford (1999). Later, the model includes S&P 500 index as a control variable to capture the effects of US markets.

The model looks at sub-sector index values of the Istanbul Stock Exchange (ISE) and tries to explain the price changes using daily crude oil prices, ISE-100 and S&P 500 indexes.

Following the Faff and Brailsford (1999) methodology, first the model uses oil prices in Turkish Liras (TL), later in the second model oil prices are used in Dollars (USD) and the USD/TL exchange rate is also included as another independent variable. The significance of this methodology is to control and capture the effects of exchange rate risk.

In the second part of the study, robustness checks are conducted using an expanded data set: January 4th 2000 - April 12th 2011

$$S_t = \beta_0 + \beta_{ISE}R_{ISE,t} + \beta_{oil}\,RT_{oil,t} + \beta_{SP}R_{SP,t} + r_t \hspace{3cm} \text{(Model 4.1)}$$

Where:

S_t : Price return of sub-sector index at time t

$R_{ISE,t}$: ISE-100 return at time t

$RT_{oil,t}$: Oil return (TL) at time t

$R_{SP,t}$: S&P 500 return at time t

β_0 is a constant term, β_{ISE}, $\beta_{OIL,}$ and β_{SP} are the coefficients of the model and r_t is the error term.

$$S_t = \beta_0 + \beta_{ISE}R_{ISE,t} + \beta_{oil}\,RU_{oil,t} + \beta_{EX}R_{EX,t} + \beta_{SP}R_{SP,t} + r_t \qquad \text{(Model 4.2)}$$

Where:

S_t : Price return of sub-sector index at time t

$R_{ISE,t}$: ISE-100 return at time t

$RU_{oil,t}$: Oil return (USD) at time t

$R_{EX,t}$: USD/TL exchange rate return at time t

$R_{SP,t}$: S&P 500 return at time t

β_0 is a constant term, β_{ISE}, $\beta_{OIL,}$ β_{EX} and β_{SP} are the coefficients of the model and r_t is the error term.

5 Analysis and Results

The model was first tested "as is" and did not include the S&P value. Table 5.1 shows these findings.

Table 5.1: Estimation of market using Oil (TL) Prices

	Adjusted R Square	Coefficient ISE 100	t-statistics	Coefficient Oil (TL)	t-statistics
Banks	.237	.487	24.443***	.022	1.114
Electricity	.184	.429	20.809***	.030	1.432
Leasing, Factoring	.144	.381	18.064***	.008	.361
Food, Beverages	.164	.406	19.446***	-.004	-.206
Holdings, Investment	.277	.527	27.183***	.019	.957
Wood, Paper, Printing	.221	.470	23.348***	.029	1.419
Chemical Petroleum Plastics	.232	.483	24.155***	.017	.872
Metal	.219	.469	23.245***	.029	1.444
Metal Products, Machinery	.278	.528	27.230***	.023	1.194
Non-M. Mineral Products	.258	.509	25.871***	.020	1.004
W. and Retail Trade	.241	.492	24.722***	.020	1.011
Textile, Leather	.217	.467	23.124***	.014	.672
Tourism	.165	.408	19.561***	.010	.456
Transportation	.151	.386	18.377***	-.044	-2.099**
Real Estate Inv. Trust	.180	.425	20.557***	-.004	-.172

*** 1% Significance, ** 5% Significance, * 10% Significance

As seen in Table 5.1, oil prices did not have any significant effects on the sub-sector indexes except to transportation at a 5% significance level. These findings contradict Eryigit's (2009) results. Although intuitively expected, in earlier results, transportation

industry had a positive coefficient and was not statistically significant, where this study showed otherwise.

The table above also shows the ISE-100 to be the main contributor to price changes in sub-sectors at a 1% significance level to every one of those sub-sectors. Next, the same model was used with the addition of S&P 500 as an independent variable. Table 5.2 shows these results:

Table 5.2: Estimation of the Market model using S&P 500 as added independent variable

	Adjusted R Square	Coefficient ISE 100	t-statistics	Coefficient Oil (TL)	t-statistics	Coefficient S&P 500	t-statistics
Banks	.240	.478	23.759***	.025	1.248	.062	3.094***
Electricity	.186	.421	20.196***	.032	1.552	.058	2.771***
Leasing, Factoring	.148	.371	17.427***	.010	.498	.068	3.183***
Food, Beverages	.165	.401	18.987***	-.003	-.135	.035	1.667*
Holdings, Investment	.281	.517	26.388***	.021	1.108	.069	3.497***
Wood, Paper, Printing	.222	.465	22.812***	.030	1.502	.040	1.938*
Chemical Petroleum Plastics	.234	.476	23.550***	.020	.976	.049	2.428**
Metal	.223	.459	22.568***	.032	1.580	.064	3.127***
Metal Products, Machinery	.279	.522	26.654***	.025	1.276	.038	1.926*
Insurance	.224	.464	22.804***	.026	1.284	.054	2.638***
Non-M. Mineral Products	.58	.504	25.350***	.021	1.072	.032	1.609
W. and Retail Trade	.241	.488	24.255***	.021	1.066	.026	1.292
Textile, Leather	.222	.457	22.443***	.016	.809	.065	3.174***
Tourism	.173	.394	18.781***	.013	.643	.091	4.347***
Transportation	.158	.374	17.640***	-.041	-1.934*	.085	4.627***
Real Estate Inv. Trust	.182	.418	20.006***	-.002	-.075	.048	2.283***

*** 1% Significance, ** 5% Significance, * 10% Significance

As seen in Table 5.2, the addition of S&P 500 did increase the R square (as expected) and was highly significant in most of the sub-sector indexes. Although ISE-100 was the major contributor to explaining the sub-sector indexes, S&P 500 did have an effect. In Real Estate Investment Trusts, Transportation, Tourism, Textile, Insurance, Metals, Holdings, Leasing and Factoring, Banks and Electricity were affected by S&P 500 at a 1% significance level, where the effects on Retail and Non-metal mineral products were not statistically significant. Oil, similar to previous model, only had an impact on Transportation, this time at a 10% significance level.

As the next step, the market model looks at the oil price in USD and adds the exchange rate as another independent variable. Table 3 shows the results:

Table 5.3: Estimation of Market model using oil price (USD) and exchange rate (USD/TL)

	Adjusted R Square	Coefficient ISE 100	t-statistics	Coefficient Oil (USD)	t-statistics	Coefficient EX USD/TL	t-statistics
Banks	.237	.489	24.481***	.032	1.628	.010	.509
Electricity	.183	.430	20.826***	.035	1.684*	.000	-.009
Leasing, Factoring	.151	.385	18.291***	.049	2.340**	.032	3.110***
Food, Beverages	.166	.408	19.549***	.021	.994	.042	2.013**
Holdings, Investment	.277	.528	27.152***	.025	1.309	.006	.293
Wood, Paper, Printing	.223	.473	23.467***	.050	2.488**	.027	1.318
Chemical Petroleum Plastics	.232	.483	24.147***	.020	.992	-.001	-.059
Metal	.219	.469	23.233***	.029	1.429	-.009	-.447
Metal Products, Machinery	.279	.529	27.286***	.036	1.855*	.014	.724
Non-M. Mineral Products	.258	.510	25.909***	.030	1.537	.011	.572
W. and Retail Trade	.241	.492	24.724***	.024	1.223	.001	.048
Textile, Leather	.219	.469	23.220***	.034	1.694*	.030	1.465
Tourism	.166	.410	19.634***	.027	1.319	.026	1.269
Transportation	.151	.387	18.375***	-.033	-1.553	.032	1.503
Real Estate Inv. Trust	.181	.427	20.653***	.020	.974	.040	1.916*

*** 1% Significance, ** 5% Significance, * 10% Significance

When the model using the dollar price of oil with the addition of exchange rate is analyzed, a different scenario can be observed. Oil prices do have a statistically significant effect on Electricity, Metal products and Machinery, and Textile at 10% significance, while it had an impact on Leasing, Factoring and Wood&Paper at 5% significance, which are consistent with Eryigit's (2009) findings.

The exchange rate return had significant effects on some sectors as well. Leasing and Factoring sector was affected at 1% significance level, Food and Beverages were affected at a 5% significance level and Real Estate Investment Trusts were affected at 10% significance level by the exchange rate (USD/TL).

Table 5.4: Market Model using oil price (USD), exchange rate (USD/TL) and S&P 500

	Ad-justed R Square	Co-efficient ISE 100	t-statistics	Co-efficient Oil (USD)	t-statistics	Co-efficient EX USD/TL	t-statistics	Co-efficient S&P 500	t-statistics
Banks	.240	.479	23.800***	.035	1.769*	.010	.481	.063	3.116***
Electricity	.186	.421	20.216***	.037	1.810*	.000	-.035	.058	2.786***
Leasing, Factoring	.155	.375	17.648***	.052	2.489**	.065	3.088***	.069	3.257***
Food, Beverages	.167	.403	19.088***	.022	1.070	.042	1.998**	.036	1.704*
Holdings, Investment	.281	.517	26.407***	.028	1.469	.005	.261	.069	3.512***
Wood, Paper, Printing	.224	.467	22.929***	.052	2.575**	.026	1.301	.040	1.980**
Chemical Petroleum Plastics	.234	.476	23.546***	.022	1.102	-.002	-.082	.049	2.436**
Metal	.222	.460	22.561***	.032	1.571	-.010	-.477	.064	3.133***
Metal Products, Machinery	.280	.524	26.711***	.038	1.941*	.014	.706	.038	1.953*
Non-M. Mineral Products	.259	.505	25.389***	.032	1.609	.011	.557	.032	1.631
Textile, Leather	.222	.459	22.540***	.037	1.840*	.029	1.438	.032	3.212***
Tourism	.174	.396	18.856***	.032	1.519	.026	1.234	.092	4.379***
Trans-portation	.158	.374	17.642***	-.029	-1.377	.031	1.471	.086	4.034***
Real Estate Inv. Trust	.183	.420	20.102***	.022	1.078	.039	1.896*	.048	2.320**

*** 1% Significance, ** 5% Significance, * 10% Significance

When the index values for S&P 500 are added to the model, it can be observed that relationships similar to the model without S&P 500 still do exist. As before, oil has the highest effects on the Leasing and Factoring and Wood&Paper. While the exchange rate still has significant effects on Leasing and Factoring, and Food and Beverage sectors. S&P 500 had minimal effect on Food and Beverage, and Metal Products/Machinery while it had no effect on Non-Metal Minerals sector.

Table 5.5: Market model using S&P 500 as control variable with extended time period.

	Adjusted R Square	Coefficient ISE 100	t-statistics	Coefficient Oil (TL)	t-statistics	Coefficient S&P 500	t-statistics
Banks	.636	.939	68.262***	-.006	-0.682	.031	1.211
Electricity	.352	.664	38.465***	-.018	-1.645*	-.019	-0.623
Leasing, Factoring	.312	.640	35.872***	-.015	-1.267	.027	0.820
Food, Beverages	.363	.595	39.429***	-.003	-0.393	-.032	-1.194
Holdings, Investment	.629	.855	67.465***	-.007	-0.900	.017	0.753
Wood, Paper, Printing	.438	.690	45.965***	-.003	-0.325	-.016	-0.599
Chemical Petroleum Plastics	.528	.715	54.882***	-.006	-0.780	.005	0.250
Metal	.497	.801	50.998***	-.006	-0.780	.005	0.250
Metal Products, Machinery	.562	.765	59.004***	-.009	-1.158	-.026	-1.106
Insurance	.494	.805	50.901***	-.004	-0.459	.043	1.524
Non-M. Mineral Products	.508	.580	52.975***	-.006	-0.859	-.019	-0.980
Textile, Leather	.419	.593	44.207***	.001	0.217	-.019	-0.782
Tourism	.296	.741	33.329***	-.001	-0.123	.056	1.395
Transportation	.437	.113	53.818***	-.031	-2.292**	.338	8.873***
Real Estate Inv. Trust	.388	.635	41.406***	-.008	-0.822	-.005	-0.027

*** 1% Significance, ** 5% Significance, * 10% Significance

This part of the study, we expanded the data span to April 12th, 2011. Interestingly, electricity and transportation were the only two sectors reacting significantly (at 10% and 5% respectively) to fluctuations in oil prices. However; interaction between the US market and most ISE sub-sectors (excluding transportation) were not observable (as seen on Table 5.5).

Table 5.6: Market Model using oil price (USD), exchange rate (USD/TL) and S&P 500 with extended time period.

	Adjusted R Square	Co-efficient ISE 100	t-statistics	Co-efficient Oil (USD)	t-statistics	Co-efficient EX USD/TL	t-statistics	Co-efficient S&P 500	t-statistics
Banks	.637	.927	64.586***	-.001	-0.027	.083	3.052***	.017	0.697
Electricity	.351	.667	37.002***	-.003	-0.224	-.033	-0.955	-.020	-0.648
Leasing, Factoring	.313	.612	31.869***	.002	0.141	.162	4.403***	.003	0.098
Food, Beverages	.365	.606	38.553***	.011	0.834	-.084	-2.810***	-.027	-0.984
Holdings, Investment	.629	.855	64.613***	.007	0.646	-.007	-0.310	.013	0.585
Wood, Paper, Printing	.439	.681	43.513***	.016	1.186	.047	1.583	-.028	-1.019
Chemical Petroleum Plastics	.527	.722	52.966***	.001	0.070	-.061	-2.347**	.011	0.487
Metal	.495	.793	48.231***	.015	1.089	.026	0.848	.066	2.287**
Metal Products, Machinery	.562	.768	56.767***	.015	1.275	-.040	-1.54	-.028	-1.202
Insurance	.495	.795	48.150***	.007	0.493	.065	2.073**	.032	1.106
Non-M. Mineral Products	.508	.588	51.384***	-.001	-0.077	-.055	-2.547**	-.014	-0.708
Textile, Leather	.417	.588	41.912***	.007	0.615	.018	0.087	-.022	-0.894
Tourism	.293	.748	32.084***	-.013	-0.635	-.061	-1.375	.068	1.674*
Trans-portation	.459	.118	54.021***	-.069	-3.572***	-.017	-0.413	.350	9.088***
Real Estate Inv. Trust	.387	.627	39.179***	-.005	-0.367	.043	1.411	-.011	-0.411

*** 1% Significance, ** 5% Significance, * 10% Significance

When the model controlled for exchange rate risk, transportation sector was the only one to show a reaction to oil price shocks (at 1% level). Tourism, metal and transportation sectors reacted significantly to US market (at 10%, 5% and 1% respectively), while the exchange rate was observed to affect banking, leasing/factoring, food/beverages, chemical petroleum plastics, insurance and non-metal mineral product sectors.

Although some of the findings are intuitively sound (i.e. transportation sector), we would have expected to find a stronger relationship between the US market and the ISE sub-sector indices with the expanded data span.

6 Conclusion

In this study, we tried to observe the effects of oil price shocks on the sub-sector indices of Istanbul Stock Exchange (ISE). A previous study conducted by Eryigit(2009), although limited in data-span and control variables, had found all sectors, including transportation, to react positively to oil price shocks. We first replicated that study and later expanded the study by controlling for the US market and increasing the data span.

Using the model where the daily returns for oil prices (TL) and ISE-100 were the only independent variables, the study found contradicting yet intuitively sound results to the

study done by Eryigit (2009). Although most all sectors were positively related, transportation sector was the only one negatively affected at a statistically significant level. Furthermore, as expected, the US stock prices had highly significant effects on most of the indices, showing Turkish stock prices were more reactive to the US market than oil prices.

Another significant finding of this study was the implications of exchange rate risk. Sub-sectors such as leasing/factoring and food/beverage sectors, were significantly affected by changes in exchange rates, where in the previous study none were found. This also is expected due to those sectors being heavily involved in foreign denominated transactions.

When we expanded the data span, transportation sector still showed to be significantly and negatively affected by oil price shocks, while banking, leasing/factoring, food/beverages, chemical petroleum plastics, insurance and non-metal mineral product sectors were found to highly react to fluctuations in exchange rates.

The findings of this study can be interpreted in several ways. First, the US market and other strong markets do affect the performance financial markets around the world. In other words, regardless of the underlying company/sector dynamics, there seems to be a direct correlation between the performance of developed markets and perceptions of investors in smaller financial structures. Having said that, it is important to note one key criticism: this study does not analyze a possible lagged response between the two markets. Due to location contingencies, ISE is eight hours ahead of the US market and developments in the second part of the US trading day will not be captured by ISE until the following day. Second, also as expected, there are several other factors which affect the performance of the indices studied here which are not controlled for. The government of Turkey has changed significantly after 2003. The new economic policies have shown to greatly shape and strengthen the dynamics of the financial infrastructure and minimize the effects of global downturns as was experienced in the 2007-2010 period. In fact, Turkey was one of the few nations who did not suffer greatly from that crisis; did not need any bailouts and the GDP grew by 6% in 2009 instead of shrinking. This was the second highest growth in the top 20 nations following China. This might also explain why the expanded data span showed less of a relationship between the US market and sub-sector indices studied in this paper. The study, however, does provide some insight for investors in market anticipation. Although most other studies have shown oil prices to be positively related with stock markets, our study suggests that other underlying factors can change the direction of the sub-sector response. Transportation sector is one of the few sectors which is affected directly by oil price shocks. Regardless of the own market or other developed markets' direction, commodities may change the very fundamentals of a sector resulting in unique responses to price shocks in those commodities.

As a conclusion it can be said that, although oil prices do affect economies, the Turkish stock market is more affected by the fluctuations of the US stock market in the short-run. However; the long-run effects cannot be captured without controlling for other variables. It also needs to be noted that the modified OLS model used in this study might not be adequate in explaining the complex nature of the problem and different models need to be tested in order to come to a more comprehensive understanding of the relationships.

References

[1]   Barberis, N and Shleifer, A, Style Investing, *Journal of Financial Economics* **26** (2003), pp. 161-199

[2]   Brown, S.P. and Yucel, M.K, Energy prices and aggregate economic activity: an interpretative survey, *Quarterly Review of Economics and Finance* **42** (2002), pp. 193–208

[3]   Cheung, Y. W., and Ng, L. K.. International evidence on the stock market and

[4]   aggregate economic activity. *Journal of Empirical Finance*; 1998, Vol. 5, p:281–296.

[5]   Chiou,J, Lee, Y, Lin, C. Existence of a Long-Run Equilibrium between the S&P 500 and Oil Prices. *International Research Journal of Finance & Economics*; 2008, Issue 21, p68-75

[6]   Clements, M. P. Krolzig, H. M. Can oil shocks explain asymmetries in the US Business Cycle, *Empirical Economics* (2002) 27:185–204

[7]   Cunado, J and Perez, G.F. Oil prices, economic activity and inflation: evidence for some Asian countries, *Quarterly Review of Economics and Finance* **45** (2005), pp. 65–83

[8]   Eryigit M., Effects of Oil Price Changes on the Sector Indices of Istanbul Stock Exchange *International Research Journal of Finance & Economics*; 2009, Issue 25, p209-216

[9]   Faff R.W. and Brailsford T.J., Oil price risk and the Australian stock market, *Journal of Energy and Finance Development* **4** (1999), pp. 69–87

[10] Jones, C.M. and Gautam, K, Oil and the stock markets, *Journal of Finance* **51** (1996), pp. 463–491.

[11] Owen, A. D. Environmental Externalities, Market Distortions and the Economics of Renewable Energy Technologies. *Energy Journal*; 2004, Vol. 25 Issue 3, p127-156

[12] Park, J., Ratti, R.A., Oil price shocks and stock markets in the US and 13 European countries. Energy Economics, *in press, doi:10.1016/j.eneco.2008.04.003*.

[13] Pindyck, R.S. & Rubinfeld, D.L. (1998). *Econometric models and Economic Forecasts* (4th ed.). Boston, Mass.: Irwin/McGraw-Hill.

[14] Sadorsky, P, Oil price shocks and stock market activity, *Energy Economics* **21** (1999), pp. 449–469.

[15] Uri, N.O. and Boyd, R.O., Economic impact of the energy price increase in Mexico, *Environmental and Resource Economics* **10** (1997), pp. 101–107.