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Petrochemical Products Market and Stock Market Returns: Empirical Evidence from Tehran Stock Exchange

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Abstract

While the relationship between stock market return and oil price is of great interest to researchers, previous studies do not investigate stock market return with petrochemical products market. In this paper, we analyzed the relationship between prices of main petrochemical products and stock returns of petrochemical companies in Tehran stock exchange. Using a panel data model and GLS estimation method, we investigated the effect of methanol, propane, and urea prices along with financial variables on stock returns of six big petrochemical companies during 2001 to 2013. Results show that although changes in prices of petrochemical products have direct effect on stock returns of all petrochemical companies, this effect is much higher for smaller companies.

Keywords: Petrochemical Products, Stock Market, Panel Data, Tehran Stock Exchange, GLS Estimation.
JEL Classification: B26, C01, C23, C58, D53.

1. Introduction

Energy prices are the most volatile among all the commodity prices. Crude oil, coal, natural gas and other oil related products e.g. refinery and petrochemical products all observe significant price fluctuations.

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These fluctuations can strongly affect stock market overall index. So, the stock market overall index not only depicts the overall performance of companies but also is an indicator of the general movement in all other markets. As stock markets play a crucial role in economic development in both developed and developing countries, any feedback from energy markets to the stock market may cause changes in economic variables.

The relationship between energy and stock market has widely been studied during the last few decades, but the concentration has been on the effect of oil price volatility on various economic variables (Cong et al., 2008). Clearly this concentration is mostly due to the fact that oil still plays the vital role in global energy market. However there has been little concentration on petrochemical products market. While for oil exporting countries the tie between stock market and energy markets is also important.

Almost 40% of Iran's non-petroleum exports is devoted to petrochemical products (Shaverdi et al., 2012). Consequently petrochemical companies and refineries appear in the list of 50 top companies in Tehran stock exchange. In fact, the financial status of petrochemical companies has the most influence on overall market index.

Petrochemical industries are one of the most profitable industries around the world. In Iran, due to its geographical location and its oil and gas natural resources, this industry has been under attention of many domestic and foreign investors and has played a vital role in industrial development of the country. Petrochemical industries are among the most important driving engines of Iran economy. Data show that petrochemical industry is a main foundation for Iran's exports. Due to diversity of the petrochemical products, petrochemical companies have high ability in economy's competitiveness. Some important petrochemical products are Propane, Methanol, Urea, Benzene, Ammoniac, Butane, etc. Among them, Propane, Methanol, and Urea are the most important petrochemical products of Iran. In first seven months of 2014, export of liquid propane has been more than 1,100 million USD, which includes 5.86% of Iran's total exports and is considered the highest-valued exported commodity of country after crude oil (TOEC, 2014). Afterward, Methanol export was 890

million USD, which includes 4.59% of Iran's total exports. In 2013, Urea was the highest-valued exported product of Iran, which due to a decrease in global market demand in this year; its production has been decreased. It should be noted that Urea has been always one of the strategic products of Iran's petrochemical industry. Figure 1 depicts main petrochemical companies of Iran and their products.

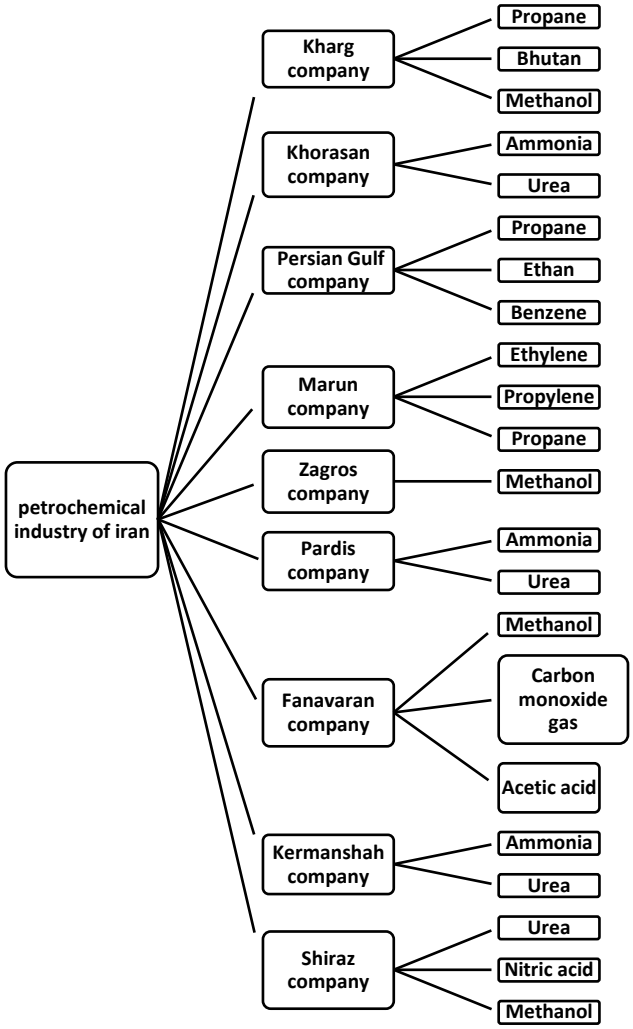

Figure 1: Main Petrochemical Companies of Iran and Their Products

Stock market indices are affected by two types of factors (Asche et al., 2003; Berument et al., 2014):

1) Internal factors, which include factors pertaining to company

decisions and its financial statements. These factors are calculated in periodic financial statements and include earning per share (EPS), price to earnings ratio (P/E), dividend per share (DPS), increase of capital, appointment of new mangers, and other inter-corporation factors.

2) External factors, which include those factors that are beyond company's control and affect its operation and consequently its stock return. These factors include political situation like war, peace, sanctions, political instability, enactment of new laws etc. In addition, macroeconomic factors are among most important external factors. For example, during economy growth period, companies gain more money and their stock return increases (See Figure 2).

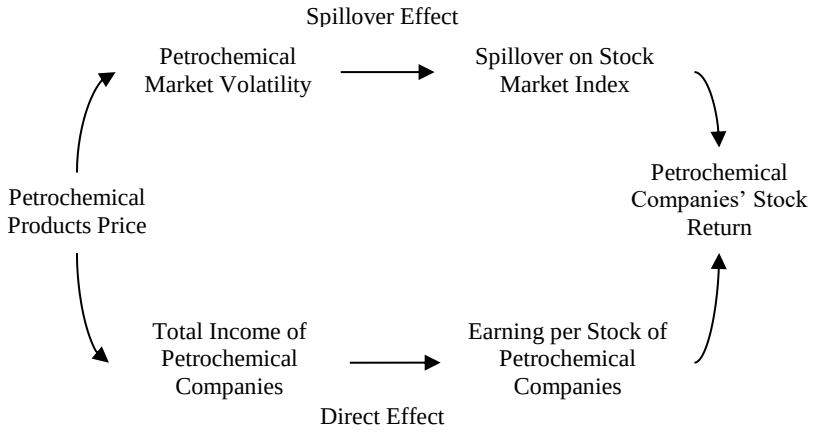

Figure 2: Effect of Prices of Petrochemical Products on Stock Return (Asche et al., 2003)

With reviewing the literature, it is clear that the most of researches are devoted to study effects of oil price shocks on stock prices in different stock markets. In this paper, we try to study the effect of changes in price of petrochemical products on stock price of petrochemical companies in Tehran stock exchange that has not been under consideration of previous researchers.

The rest of the paper is organized as follows; In Section 2, we review the literature of subject. Used method and its methodology are presented in Section 3. In section 4, the results of models are showed.

Finally, Section 5 includes the conclusion of the paper and some suggestions for future researches.

2. Literature Review

Many researchers have concentrated on the relationship between oil price changes and stock market returns in different countries. The concentration has mainly been on the effect of oil price shocks on stock returns in different markets.

Asche et al. (2003) surveyed relationship between crude oil price and refined products prices in a multi variant framework. Using multi variant analysis, they showed that this relationship indicate integration of market of such products. Hanabusa (2010) studied the effect of worldwide crisis on petrochemical products in financial market prospect. In his paper, he considered specifically effect of September 11 attacks, Iraq war, and Hurricane Katrina on stock prices of Japan petrochemical industries. Empirical evidences demonstrated that after September 11 attacks, increase in stock return of private companies led to increase in stock return of Japan petrochemical industries, While, such effect was not seen about Iraq war and Hurricane Katrina. Kendix & Walls (2010) studied effect of refineries shut down on prices of oil products. They used data panel regression method in their work and concluded that refineries shut down have positive and meaningful effect on prices of petrochemical products. They also showed that such effect is higher for fuels. Berument et al. (2014) studied effect of crude oil price and currencies exchange rates on prices of petrochemical products. They showed that in north Mediterranean countries, one percent increase of exchange rate would increase price of petrochemical products less than one percent in long term. However, in short term, one percent increase of exchange rate, would increase price of petrochemical products more than one percent. These were instances researches pertaining to effects of oil price shocks on prices of petrochemical products.

In recent years, many researches are concentrated on financial markets and pertaining topics. For example, some authors studied stock market indices, stock price prediction methods, and factors pertaining to financial context (Chang, 2011; Chen et al., 2010; Freitas et al., 2009; Grechuk & Zabarankin, 2014; Huang & Ying, 2013; Li et

al., 2013; Mansini et al., 2014; Miralles-Marcelo et al., 2013; Patel et al., 2015; Wang et al., 2012). Many researches are directed to the effect of oil price shocks on stock markets, for example Zhu et al. (2011) considered oil price shocks and stock markets using threshold co-integration method and panel data. Chang et al. (2013) studied relationship between crude oil prices and stock returns using a CCC model. The results suggest that this relationship is negligible. Hence, price shocks in one market are limited only to that market. Empirical evidences resulted from VARMA-GARCH and VARMA-AGARCH showed little spillover from crude oil market to stock markets. Nguyen & Bhatti (2012) studied the relationship between oil price and China and Vietnam stock markets using Copula model. They introduced uncertainty of national economy as a determinant of oil price fluctuations. They tried to determine the relations between China and Vietnam market using parametric and non-parametric tools and found different behavior in these countries against global oil price. Acaravci et al. (2012) studied relationship between price of natural gas and stock prices in E-15 countries. They used Johansen & Juselius co-integration and error-correction methods based on Granger causality model in their work. They identified a long-term balancing relationship between price of natural gas and stock prices in Australia, Denmark, Finland, Germany, and Luxembourg. Such relation could not be witnessed in other 10 countries. Cunado & Perez de Gracia (2014) surveyed oil price shocks and stock return in some European countries. They used VAR and VECM methods. Their main finding was that depending to reason of oil price shocks, responses of European stock markets to oil price shocks can be different. They also found specific and negative influence of oil price shocks on stock return of most European countries. Benada (2014) studied effect of crude oil on Prague stock market. He aimed at analyzing the effect of crude oil price increase on this stock market.

Sukcharoen et al. (2014) used Coupla method to find general relationship between stock return and oil price return. Their results showed that there is a weak relation in most cases, whereas, in some countries like USA and Canada there is a strong one. Zhu et al. (2014) modeled dynamic relation of stock return and oil price in 10 Asia-pacific countries. They used AR and GARCH(1,1) methods for

marginal and fixed distributions, and time-varying Copula method for joint distributions. Results showed that there is a weak relation between the two above mentioned variables in Asia-pacific countries. Wang et al. (2013) considered relationship between oil price shocks and stock markets in both petroleum exporter and petroleum importers countries. They used structural VAR analysis method. Results showed that stock markets' responses to oil price shocks are dependent to whether the country is petroleum exporter or petroleum importer. In addition, such responses is dependent to how oil is important to countries national economies, i.e., demand uncertainty effect on stock markets in petroleum exporter countries is much stronger than petroleum importers countries. Park & Ratti (2008) studied oil price shocks and stock markets in United States and other 13 European countries. They used variance analysis in their study and showed that real stock return in those countries is higher than interest rate. In addition, there is a strong relationship between increases in short term interest rate and increases in oil price. Jouini (2013) considered stock markets in GCC countries and global factors. Global factors included oil price, MSCI (Morgan Stanley Capital International) index, and US interest rate that were analyzed using panel data techniques. Results showed that when countries are dependent to each other, there is a long-term non-linear relation between variables of interest. In addition, they showed that global factors affect predictability of stock markets in GCC countries. Dagher and El Hariri (2013) studied the effect of oil price shocks on Lebanon stock market. They used variance decomposition VAR method to survey relationship between daily Brent oil price and stock prices in Lebanon. The main conclusion of their study was that the estimated level of effect of oil price shocks on Lebanon stock market is positive but marginal. Aydogan & Berk (2015) studied oil price shocks and stock return in Turkey. They used VAR method and found evidences indicating reasonable effect of oil price shocks on Turkey stock market. Eryigit (2012) studied oil price shocks and selected macroeconomic variables in Turkey. He used VAR method and found that there is a dynamic relationship between oil price shocks, overall index of Istanbul stock market, and interest rate. Ravichandran and Alkhathlan (2010) studied effect of oil price on GCC stock markets. They used Co-integration

method to prove that long-term oil price changes affects GCC stock return. Maboudian and Shokri (2015) have studied the effect of oil price shocks on Tehran Stock Exchange index. They identified the impact of oil supply shock, aggregate demand shock, other stock specific shock and other oil specific shock on the stock market. Their results showed that oil supply shock is not significant, and impact of other shocks persists for 3, 2 and 6 months, respectively.

The frequency of data in previous studies has varied between yearly and daily (Chang et al., 2013; Cifarelli & Paladino, 2010; Hammoudeh & Choi, 2007; Arouri & Nguyen, 2010). In this paper due to the lack of daily and weekly data about the financial performance of petrochemical companies we have considered annual time period to data analysis. As seen in all above studies, the focus of researches is on studying effects of oil price shocks on stock prices in different stock markets. In this paper, we aim at studying the effect of changes in price of petrochemical products on stock price of petrochemical companies in Tehran stock exchange, a subject that has not been under consideration of previous researchers. On the other hand, we consider other exogenous factors to strengthen our analysis.

Also, panel modelling is an effective tool for estimation of the relationship between different factors. We can reference to (Karimi 2016; Rasoulinezhad and Kang 2016) as the researches that have investigated economic factors with this method, recently. Table 1 summarizes some important studies concerning the relationship between oil price shocks and stock exchange market.

3. Methods

We used annual prices of propane, methanol, and urea as the main petrochemical products of Iran during 2001-2013 periods to evaluate the effect of changes in prices of these products on stock returns of petrochemical companies in Tehran stock exchange. In addition to petrochemical products prices, other internal and external factors such as overall return of market, earning per share of each company, and a dummy variable for 2008 global economic crisis are also used as

Table 1: Review of Method and Findings of Previous Researches

Author	Method	Core analysis
Chang et al. (2013)	CCC Model	Crude oil price↔ stock market return
Nguyen, Bhatti (2012)	nonparametric (chi- and K-plots) and parametric (copula) methods	Oil prices → Vietnam and China stock markets
Zhu et al. (2011)	panel threshold cointegration approach	oil price shocks markets → OECD and Non-OECD stock markets
Benada (2014)	Two factor model	crude oil prices → Prague stock market
Hanabusa (2010)	GARCH	global disasters → on stock prices of the entire Japanese petroleum industry
Kendix , Walls (2010)	panel data regressions	The effect of refinery outages → petroleum products prices
Acaravci et al. (2012)	Cointegration	Natural gas prices → EU-15 stock market returns.
Cunado, Gracia (2014)	VECM , VAR	Oil price → European stock market returns
Asche et al. (2003)	Multivariate analysis	Crude oil prices →Refined product prices
Sukcharoen et al. (2014)	Copula Model	Interdependence oil prices ↔ Stock market
Zhu et al. (2014)	Time-Varying Copula	Interdependence crude oil prices ↔ Asia Pacific stock return
Wang et al. (2013)	Structural VAR analysis	Oil price shocks → Stock market returns
Park, Ratti (2008)	Variance Decomposition	Oil price shocks → U.S. and 13 European Countries
Jouini (2013)	Panel	Global macroeconomic indicators → GCC stock markets
Dagher, Hariri (2013)	variance decomposition VAR	Global oil prices → Lebanese stock market
Berk, Aydogan (2012)	VAR	Crude oil price → Turkish stock market.
ERYIĞIT (2012)	VAR	Oil price shocks → Macroeconomic variable in turkey
Ravichandran, Alkhathlan (2010)	Cointegration	Oil prices → GCC stock market

exogenous variables. Data pertaining to stock return of petrochemical companies and other required data are collected from data bank of (TSE 2014) and data pertaining to petrochemical product prices are collected from (ICIS 2014). So, the research hypothesizes are:

- An increase in Propane prices has a positive effect on stock return of petrochemical companies in Tehran stock exchange.
- An Increase in Methanol prices has a positive effect on stock return of petrochemical companies in Tehran stock exchange.
- An increase in Urea prices has a positive effect on stock return of petrochemical companies in Tehran stock exchange.

Use of panel data method has two advantages to time series method and cross sectional methods. First, it makes researchers able to consider relationships between variables and even units during the time. Second, the panel data method is able to control individual effects of sectional units that are not observable and measurable (Harris and Sollis 2003).

The general form of panel data regression model is as follows:

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \quad i = 1,\dots,N; t = 1,\dots,T = 1,\dots,T \qquad (1)$$

With respect to parameter α estimation approach, panel data models are categorized into two groups; fixed effects models and random effects models. In fixed effects models, we assume that individual or group differences can be reflected in a fixed term. Each α_i is an unknown coefficient that must be estimated. α_i demonstrates the factors that affect Y_{it} in panels, but the effect of these factors are fixed during the time. Assume that Y_i and X_i include T observations for group *i*, then we have:

$$Y_{it} = \beta X_{it} + \alpha_i + \varepsilon_{it} \qquad (2)$$

α_i is different for each group. In order to estimate α_i, we define a dummy variable for each group. So, we can rewrite the model using these dummy variables:

$$Y_{it} = \beta X_{it} + \alpha_1 D_1 + \alpha_2 D_2 + \cdots + \alpha_n D_n + \varepsilon_{it} \qquad (3)$$

For example, D_1 is equal to 1 for group 1 and equal to 0 for other

groups.

In random effects model, the fixed term α demonstrates heterogeneity of data or unobserved differences. Here, individual or group heterogeneities are shown with $z_i'\alpha$ and average of them are showed with E($z_i'\alpha$). In fact, as is depicted in equation 4, u_i includes factors that are not considered in regression model but are dedicated to each group.

$$Y_t = \sum_{k=1}^{K} \beta_k X_{kit} + (\alpha + u_i) + \varepsilon_{it}\ ,\ Y_t = X_{it}'\beta + (\alpha + u_i) + \varepsilon_{it} \qquad (4)$$

Fixed effects test is equivalent to test of meaningfulness of coefficient α_i (test of hypothesis $\alpha_i = 0$) and we use t ratio to do it. This hypothesis applies only to a specific group. To test group effects simultaneously, we can use F test. In this case, we test whether group effects are different (i.e., α_i are different) or equal (i.e., α_i are equal). In this way, we have $H_0 = \alpha_1 = \alpha_2 = \cdots = \alpha_n = \alpha$. So we have equation (5) under H_0 and equation (6) under H_1.

$$Y_t = \sum_{k=1}^{K} \beta_k X_{kit} + \sum_{i=1}^{n} \alpha_i D_i + \varepsilon_{it} \qquad (5) \quad \text{Restricted regression}$$

$$Y_t = \sum_{k=1}^{K} \beta_k X_{kit} + \alpha + \varepsilon_{it} \qquad (6) \quad \text{nrestricted regression}$$

Equation (5) is LSVD regression that considers group differences and so it is called unrestricted regression. Equation (6) is aggregated regression that does not consider group differences, considers α_i s equal, and so it is called restricted regression. For any of these equations, we calculate RSS, R^2 and F as follows:

$$F = \frac{(RSS_R - RSS_{UR})/(n-1)}{RSS_{UR}/nT-k-n} \qquad (7)$$

If the calculated F is higher than the confidence level, it means that we should reject H0 and so, fixed effects are statistically significant and α_i are not equal. In other words, individual or group differences are significant.

As seen above, in fixed effects model, $\hat{\beta}$ is estimated based on intergroup regression or LDSV that is defined as deviation from groups averages and individual effects (whether fixed that is denoted by α_i or random that is denoted by u_i) are removed from it. Hence, $\hat{\beta}_W$ or $\hat{\beta}_{LSVD}$ have no bias and are consistent. In order to check random effects, Hausman test is proposed. $\hat{\beta}_{GLS}$ is efficient and consistent in

$Y_{it} = \beta X_{it} + \alpha_i + \varepsilon_{it}$ model , when we have $E(u_i X_{it}) = 0$ for each t. If X_{it} is endogenous and makes$E(u_i X_{it}) \neq 0$, then GLS estimator would be inconsistent.

$$\hat{\beta}_{GLS} = (X'\Omega^{-1}X)^{-1}(X'\Omega^{-1}y) = \beta + (X'\Omega^{-1}X)^{-1}(X'\Omega^{-1}v) \quad (8)$$

In equation (8), we have $y = X\beta + v$ and $v = u + \varepsilon$. Now, we substitute $\Omega^{-1} = \frac{1}{\sigma^2}(\mathrm{Q} + \lambda \mathrm{B})$ in equation (8). If independent variables and the stochastic term are independent, GLS estimator would be consistent. The main result of Hausman test is that covariance of efficient estimator minus inefficient estimator is equal to zero. In this way, χ^2 statistics of random effects test is defined as follows:

$$w = \hat{q}'\widehat{\Phi}^{-1}\hat{q} = (\hat{\beta}_{GLS} - \hat{\beta}_{LSDV})'\widehat{\Phi}^{-1}(\hat{\beta}_{GLS} - \hat{\beta}_{LSDV}) \quad (9)$$

To calculate $\widehat{\Phi}$, we use covariance matrix of slope estimators (X coefficients) in LSVD model and covariance matrix of random effects model (except for y-intercept). Under H_0, W follows a chi-square distribution with k-1 degree of freedom (k-1 is equal to coefficient of X). As GLS estimator is more efficient than inter-group estimator (LSD), Under H_0 hypothesis we have:

$$var(\hat{\beta}_W) - var(\hat{\beta}_{GLS}) \geq 0$$

Based on assumptions given for estimating stock return of considered companies, we have to define prices of petrochemical products as independent variables in the model. In addition, we have to define other variables such as market return index and earning per share of companies. Finally, we consider a dummy variable as an independent variable. We use this dummy variable to incorporate economic crisis of 2008 in the model. In this paper, we use three models to estimate the effect of different factors on stock return of petrochemical companies. In the first model, we test effect of urea price and other variables such as earning per share, market index return, and dummy variable on companies stock returns. In the second and third model, we consider effect of propane and methanol prices along with other above mentioned variables respectively.

Model 1: $SR_{it} = \alpha + \beta_1 \times EPS_{it} + \beta_2 \times MR_{it} + \beta_3 \times Dum_{it} + \beta_4 \times URP_{it}$ (10)

Model 2: $SR_{it} = \alpha + \beta_1 \times EPS_{it} + \beta_2 \times MR_{it} + \beta_3 \times Dum_{it} + \beta_4 \times PRPP_{it}$) (11)

Model 3: $SR_{it} = \alpha + \beta_1 \times EPS_{it} + \beta_2 \times MR_{it} + \beta_3 \times Dum_{it} + \beta_4 \times MTHP_{it}$ (12)

In our model,SR_{it} is stock return of company i in time t, EPS_{it} is earning per share of company i in time t, MR is market return, Dum is dummy variable, PRPP is the propane's price, URP is urea's price, and MTHP is methanol's price.

4. Results

Tables 2 and 3 show the descriptive statistics of different variables. We used nominal prices for petrochemical prices as these prices are globally determined and are not related to domestic inflation. As it is depicted, the Urea's prices are higher than other two petrochemical prices. This product has also the highest variance among three different products. Using Jarque-Bera statistics, the null hypothesis of normality of variables is tested. As results show all variables are normally distributed at 95% level of confidence. Company wide data also shows that the highest EPS relates to Khark petrochemical company. Meanwhile the highest stock return corresponds to Farabi Corporation.

Table 2: Descriptive Statistics of Common Variables among Corporations

	Index return	Exchange rate	Methanol	Oil	Propane	Urea
Mean	0.243462	13390.77	395.9832	65.24385	124.8741	265.5840
Median	0.154000	9350.000	371.4285	61.08000	132.8106	249.5758
Maximum	1.280000	32000.00	871.4285	109.4500	194.2949	492.7258
Minimum	-0.044000	7920.000	171.4285	23.12000	54.40700	94.36167
Std. Dev.	0.343234	8700.408	180.9178	32.05405	43.91563	125.8457
Jarque-Bera	22.78945	5.775266	7.589166	1.029602	0.449110	0.627774
Probability	0.000011	0.055708	0.022492	0.597619	0.798872	0.730602

Table 3: Descriptive Statistics of Individual Variables of Corporations

	EPS					Stock return				
	Abadan	Farabi	Esfahan	Shekhark	Shiraz	Abadan	Farabi	Esfahan	Shekhark	Shiraz
Mean	1175.462	670.6154	1937.769	3015.615	1430.692	0.061000	0.288462	-0.020769	0.144615	0.094615
Median	950.0000	122.0000	1438.000	2226.000	1149.000	0.160000	0.130000	-0.130000	0.140000	0.080000
Maximum	2800.000	4422.000	5264.000	7389.000	4652.000	1.110000	2.950000	0.790000	0.930000	1.460000
Minimum	327.0000	-140.0000	416.0000	973.0000	623.0000	-1.240000	-0.950000	-0.960000	-0.860000	-1.170000
Std. Dev.	598.4999	1396.215	1413.250	2004.660	1039.921	0.590155	1.018192	0.521112	0.531329	0.720667
Jarque-Bera	7.616405	12.55534	2.405475	2.134987	29.09522	0.566050	6.613714	0.392204	0.592941	0.209141
Probability	0.022188	0.001878	0.300371	0.343869	0.000000	0.753501	0.036631	0.821929	0.743438	0.900711

The first step in estimating the research models is conducting unit root test. With respect to theory of econometrics, existence of unit root in research variables would result in spurious regressions and consequently, the regression results would be invalid. Table 4 presents results of unit root test for research variables. As seen in this table, all of the research variables are stationary in 90, 95, and 99 percent level of confidence. Since results of unit root test are sensitive to number of lags, the optimum lag length is calculated using SBC criterion.

Table 4: Results of Unit Root Test for Research Variables

Variable Name	Levin, Lin & chu t*	Optimal Lag length	Im, Pesaran and Shin W-stat	Optimal Lag length	ADF – Fisher Chi-square	Optimal Lag length
EPS	-4.41237***	1	-2.72090***	0	30.6642***	0
Index Return	-5.17617***	0	-2.78717***	0	23.7778***	0
Methanol Price	-3.05718***	0	-2.18754**	1	26.43290**	1
Oil Price	-5.89651***	0	-2.68939***	0	25.0504***	0
Propane Price	-2.57401***	0	-1.51997**	1	19.29927*	1
Stock Return	-4.93581***	0	-3.50045***	0	29.8934***	0
Urea Price	-4.60676***	0	-1.71138**	0	16.8344*	0

* 90% confidence coefficient
**95% confidence coefficient
***99% confidence coefficient

After confiding of research variables' stationary, we have to test

fixed and random effects. Table 5 shows the results of random and fixed effect tests. According to this table the null hypothesis of $\alpha_1 = \alpha_2 = \cdots = \alpha_n = \alpha$ is rejected and also we concludes that the GLS estimator is more efficient than inter-group estimator (LSDV). So the table suggests that all three models are random effect and should be estimated using GLS method.

Table 5: Random and Fixed Effects Tests

Test	Model 1	Model 2	Model 3
Random effect test (Husman test)	0.001	0.004	0.003
Probability	0.998	0.989	0.991
Fixed effects test (F-test)	1.157891	1.196943	1.350355
Probability	0.3392	0.3223	0.2629
Result	Random Effect Model	Random Effect Model	Random Effect Model

Table 6 presents estimation results of proposed models. As seen in the table, there is a positive and significant relation between prices of urea and propane with stock return of petrochemical companies. However, no such relation exists for methanol.

Table 6: Estimation Results of Proposed Models

Variable Name	Model 1	Model 2	Model 3
MR	0.669415*** (0.200596)	0.500917** (0.238081)	0.204307 (0.221976)
EPS	---	9.73E-05* (5.46E-05)	0.000110* (5.76E-05)
URP	0.002985*** (0.000859)	---	---
PRPP	---	0.004572** (0.001801)	---
MTHP	---	---	-0.000278 (0.000659)
Dum	-1.616020*** (0.319962)	-1.153607*** (0.254885)	-0.721238* (0.405480)
R-Squared	0.335009	0.263147	0.214894
F-Statistic	7.556691	5.356837	4.105707
Estimation Method	GLS	GLS	GLS

* 90% confidence coefficient
**95% confidence coefficient
***99% confidence coefficient

This result can be interpreted in such manner that Methanol producers in the market are large companies that their stock returns are affected mostly by fundamental factors e.g. foreign exchange rates, macroeconomic variables etc. So the results show that although petrochemical products prices could influence the stock return of relatively small companies, for large companies these price changes play a minor role. As we expected, stock return of petrochemical products has positive relationship with overall market return. This is not the case in model 3, in which not only methanol prices has not a significant effect on companies stock returns but also the market return coefficient is not statistically significant.

5. Discussion and Conclusion

In this study, we analyzed the effect of price of petrochemical products on stock return of petrochemical companies in Tehran stock exchange. Review of previous studies showed that researchers have mostly concentrated on investigating the effect of oil price fluctuations on overall return of stock markets. However, petrochemical products as important and strategic products play a vital role in transferring price shocks from oil market to stock markets. i.e., when oil's price is fluctuating, price of petrochemical products also fluctuates, and consequently, performance of petrochemical companies is affected. Results of this study show that when prices of propane and urea increase, stock return of petrochemical companies increases accordingly. However, results show that such relation is not valid for methanol. This is due to the fact that methanol producers are big companies with strong background in the market. In other words, the main conclusion of current study is that although changes in prices of petrochemical products have directs effect on stock return of petrochemical products, smaller companies should be more concerned about fluctuations of these prices.

This study can be extended in several ways; we recommend similar studies in other petroleum exporter countries. The current study has focused on Tehran stock exchange, extending it to other stock markets in Middle East and other areas can open new windows to study relationship between petrochemical products market and stock market. In addition, research can be done regarding shocks between petrochemical products

market and stock market using multi vitiate GARCH models.

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