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Full Length Research Paper

Forecasting stock price of Iranian major petrochemical companies

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The issue of forecasting the stock prices of the companies attending the stock exchange market is a very important problem for investors. The ability of forecasting stock prices would enable them to choose the best investment basket leading to high benefits. In this paper, we intend to forecast the price of stocks of the major Iranian petrochemical companies. For this purpose, the regression models are used. There are some important independent variables which play a key role in determining the prices of these companies. The models are run in the software E-views. This paper discusses choosing best decision between one or more of petroleum companies for beneficiary business markets and how it would be applicable and effective on making decision on stock investment.

Key words: Stock price, forecasting, optimization, price budget assignment.

INTRODUCTION

Let us suppose based on a consultant advice regarding finance, someone, in order to add to his wealth, has to choose to invest in a certain number of shares in petroleum companies' stock. He wishes to invest in 5 different shares. The consultant estimates the return on the investment that he may expect for a period of some months. But the question is: "How the capital should be divided among the shares to obtain the highest expected return on investment?" That will be answered in this paper with reliable method in real cases. Since the foundation of Iran stock exchange market, many Iranian large companies have joined this market. Among them, the majority of petrochemical companies can be seen. These companies are from the most benefiting ones in Iran for many of which there is high popularity by the investors. In this paper, an effort is done to forecast the stock price of five major petrochemical companies whose names are: Abadan, Arak, Isfahan, Farabi and Khark (Tables 3, 4 and 5).

JEL classification: C61, E37, G17, G31.

MATERIALS AND METHODS

Model definition

The purpose of this paper is to propose regression models for each company. The general form of these models is as follows (Zenios, 2007):

$$y=c+ax_1+bx_2+dx_3+ex_4+fx$$

In order to develop the model, each of the parameters should be estimated.

Variables definition

The key variables of the problem are as follows:

Dependent variables: y= stock price (named PRICE in E-Views) Independent variables: x_1= stock price in the last month (named PREPRICE in E-Views); x_2 = capital of the company (named CAPITAL in E-Views); x_3 = P/E (named P_E in E-Views); x_4 = DPS (named DPS in E-Views) and x_5 = EPS (named EPS in E-Views)

Table 1a. Computational results for Abadan Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3747.181	1472.910	2.544066	0.0133
Preprice	0.501155	0.102734	4.878159	0.0000
Capital	-4.71E-08	1.37E-08	-3.426872	0.0011
P_E	420.5379	133.4037	3.152370	0.0024
DPS	0.064232	0.163433	0.393017	0.6956
EPS	3.408682	2.132842	1.598188	0.1148
R^2	0.784425	Mean dependent var		10875.69
Adjusted R^2	0.768093	S.D. dependent var		4611.025
S.E. of regression	2220.517	Akaike info criterion		18.32852
Sum squared resid	3.25E+08	Schwarz criterion		18.51825
Log likelihood	-653.8268	F-statistic		48.03150
Durbin-Watson stat	2.117900	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/31/09 Time: 01:26; Sample: 1381:01 1386:12; Included observations: 72

Table 1b. Computational results for Abadan Company.

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	4184.749	958.2118	4.367249	0.0000
PREPRICE	0.505175	0.101577	4.973325	0.0000
CAPITAL	-4.61E-08	1.34E-08	-3.437876	0.0010
P_E	420.6815	124.6345	3.230900	0.0019
EPS	3.814962	1.853770	2.057949	0.0435
R^2	0.783920	Mean dependent var		10875.69
Adjusted R^2	0.771020	S.D. dependent var		4611.025
S.E. of regression	2206.462	Akaike info criterion		18.30308
Sum squared resid	3.26E+08	Schwarz criterion		18.46119
Log likelihood	-653.9110	F-statistic		60.766764
Durbin-Watson stat	2.122979	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/31/09; Time: 01:57; Sample: 1381:01 1386:12; Included observations: 72.

Data gathering

All the data needed to run the problem were gathered from the library of Tehran Stock Exchange Market. The data are on a monthly basis. For the variable whose data existed on a daily basis, we converted them to a monthly basis, by using either its mean or its summation (Xun et al., 2009; Melike and Özgur, 2009).

RESULTS

Hereby, the results of the running of the software for all the companies are presented.

Abadan Company

After running the software with the data of Abadan Company, the results as shown in Table 1a indicates that the P-values of the variables x_4 (DPS) and x_5 (EPS) are higher than 0.05. This shows that the coefficients of these two variables are not statistically significant. Consequently, to overcome this problem, the less significant variable x_4 is removed from the model, and the model is re-run. The results in Table 1b shows that after removing the variable x_4 and re-running the model, the variable x_5 became significant. So, the following regression model is determined to forecast the stock price of this company:

$$y=4184.749+0.505175x_1-4.61*10^{-8}\ x2+402.6815x_3+3.814962x_5$$

Arak Company

After running the software with the data of Arak Company, the results as shown in Table 2a shows that the P-value of the variable x_4 (DPS) is higher than 0.05. This shows that the coefficients of these two variables are not statistically significant. Consequently, to solve this problem, the variable x_4 is removed from the model as

Table 2a. Computational results for Arak Company

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1425.993	663.0517	2.150652	0.0352
PREPRICE	0.622894	0.062243	10.00743	0.0000
CAPITAL	-4.09E-09	1.37E-09	-3.612506	0.0006
P_E	500.0594	84.14201	5.943041	0.0000
DPS	0.141333	0.131298	1.076425	0.2857
EPS	1.216825	0.505245	2.408386	0.0188
R^2	0.936971	Mean dependent var		8800.736
Adjusted R^2	0.932196	S.D. dependent var		3457.893
S.E. of regression	900.4071	Akaike info criterion		16.52323
Sum squared resid.	53508370	Schwarz criterion		1671295
Log likelihood	-588.8361	F-statistic		196.2275
Durbin-Watson stat	2.278795	Prob (F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/30/09 Time: 22:48; Sample: 1381:01 1386:12; Included observations: 72

Table 2b. Computational results for Arak Company

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1326.032	657.2933	2.017412	0.0477
PREPRICE	0.596248	0.057177	10.42815	0.0000
CAPITAL	-3.10E-09	6.62E-10	-4.681383	0.0000
P_E	524.9779	80.99067	6.481955	0.0000
EPS	1.632180	0.326546	4.998312	0.0000
R^2	0.935865	Mean dependent var		8800.736
Adjusted R^2	0.932036	S.D. dependent var		3457.893
S.E. of regression	901.4728	Akaike info criterion		16.51285
Sum squared resid	54447759	Schwarz criterion		16.67095
Log likelihood	-589.4627	F-statistic		244.4158
Durbin-Watson stat	2.190596	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/30/09 Time: 22:59; Sample: 1381:01 1386:12; Included observations: 72.

well, and the model is re-run. This result, as shown in Table 2b, proves that removing the variable x_4 makes the model significant. So, the following model is proposed for Arak Company:

$$y=1326.032+0.596248x_1-3.1*10^{-9}x_2+524.9779x_3+1.632180x_5$$

Isfahan Company

There are three variables which are not significant: x_3, x_4, x_5. So x_4 which is less significant should be omitted from the model.

Again, x_5 is not significant. So, this variable is omitted as well. So, the final model for this Company is as follows (Tables 3a, b and c):

$$y=8227.569+0.559811x_1-2.16*10^{-8}x_2+202.6755x_3$$

Farabi Company

Among the variables of this company, x_5 is not significant. So, this variable should be removed from the model. As observed, removing the x_5 makes the variable x_2 non-significant. So, the variable x_2 is removed as well. Consequently, the following model is considered for Farabi (Table 4a, b and c) Company:

$$y=10629.3+0.726151x_1+300.5526x_3-0.654234x_4$$

Khark Company

For non-significance, x_4 should be omitted from the model. So, the regression model for stock price of Khark (Tables 5a and b) Company is as follows:

Table 3a. Computational results for Isfahan Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8043.251	2413.414	3.332728	0.0014
PREPRICE	0.548789	0.095758	5.730983	0.0000
CAPITAL	-1.59E-08	7.16E-09	-2.220432	0.0298
P_E	316.3728	166.3001	1.902421	0.0615
DPS	-0.011350	0.024522	-0.462864	0.6450
EPS	-0.821144	0.883472	-0.929450	0.3560
R^2	0.902528	Mean dependent var		14064.74
Adjusted R^2	0.895143	S.D. dependent var		6328.015
S.E. of regression	2049.112	Akaike info criterion		18.16786
Sum squared resid	2.77E+08	Schwarz criterion		18.35758
Log likelihood	-648.0428	F-statistic		122.2228
Durbin-Watson stat	1.926372	Prob(F-statistic)		0.000000

Dependent variable: PRICE; Method: Least Squares; Date: 01/30/09; Time: 22:58; Sample: 1381:01 1386:12; Included observations: 72.

Table 3b. Computational results for Isfahan Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7515.065	2114.086	3.554759	0.0007
PREPRICE	0.560710	0.091688	6.115429	0.0000
CAPITAL	-1.73E-08	6.42E-09	-2.700748	0.0088
P_E	330.9686	162.3228	2.038954	0.0454
EPS	-0.896183	0.863363	-1.038014	0.3030
R^2	0.902211	Mean dependent var		14064.74
Adjusted R^2	0.896373	S.D. dependent var		6328.015
S.E. of regression	2037.061	Akaike info criterion		18.14332
Sum squared resid	2.78E+08	Schwarz criterion		18.30142
Log likelihood	-648.1595	F-statistic		154.5373
Durbin-Watson stat	1.957159	Prob(F-statistic)		0.000000

Dependent variable: PRICE; Method: Least Squares; Date: 01/31/09 Time: 01:12; Sample: 1381:01 1386:12; Included observations: 72.

Table 3c. Computational results for Isfahan Company.

Variable	Coefficient	Std Error	t-Statistic	Prob.
C	8227.569	2000.688	4.112369	0.0001
PREPRICE	0.559811	0.091736	6.102418	0.0000
CAPITAL	-2.16E-08	4.93E-09	-4.385128	0.0000
P_E	202.6755	105.2883	1.924958	0.0584
R^2	0.900638	Mean dependent var		14064.74
Adjusted R^2	0.896255	S.D. dependent var		6328.015
S.E. of regression	2038.221	Akaike info criterion		18.13149
Sum squared resid	2.82E+08	Schwarz criterion		18.25798
Log likelihood	-648.7338	F-statistic		205.4566
Durbin-Watson	1.929453	Prob(F-statistic)		0.000000

Dependent variable: PRICE; Method: Least Squares; Date: 01/31/09 Time: 3:02; Sample: 1381:01 1386:12; Included observations: 72.

Table 4a. Computational results for Farabi Company.

Variable	Coefficient	Std Error	t-Statistic	Prob.
C	12716.73	3296.648	3.857473	0.0003
PREPRICE	0.689699	0.063794	10.81133	0.0000
CAPITAL	-4.28E-08	2.20E-08	-1.941390	0.0565
P_E	276.2609	72.07959	3.832721	0.0003
DPS	-0.708694	0.209071	-3.389720	0.0012
EPS	1.478966	1.300469	1.137256	0.2595
R^2	0.930132	Mean dependent var		11152.12
Adjusted R^2	0.924839	S.D. dependent var		5253.033
S.E of regression	1440.149	Akaike info criterion		17.46254
Sum squared resid	1.37E+08	Schwarz criterion		17.65226
Log likelihood	-622.6513	F-statistic		175.7268
Durbin-Watson stat	1.873794	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/30/09 Time: 23:05; Sample: 1381:01 1386:12; Included observations: 72.

Table 4b. Computational results for Farabi Company.

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	10509.57	2670.650	3.935212	0.0002
PREPRICE	0.686405	0.063868	10.74729	0.0000
CAPITAL	-3.43E-08	2.08E-08	-1.649886	0.1036
P_E	311.1609	65.36318	4.760492	0.0000
DPS	-0.563907	0.166201	-3.392915	0.0012
R^2	0.928763	Mean dependent var		11152.12
Adjusted R^2	0.924510	S.D. dependent var		5253.033
S.E of regression	1443.299	Akaike info criterion		17.45417
Sum squared resid	1.40E+08	Schwarz criterion		17.61227
Log likelihood	-623.3500	F-statistic		218.3790
Durbin-Watson stat	1.800580	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/31/09 Time: 01:16; Sample: 1381:01 1386:12; Included observations: 72.

Table 4c. Computational results for Farabi Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10629.30	2703.257	3.932034	0.0002
PREPRICE	0.726151	0.059894	12.12384	0.0000
P_E	300.5526	65.86468	4.563183	0.0000
DPS	-0.654234	0.158900	-4.117259	0.0001
R^2	0.925868	Mean dependent var		11152.12
Adjusted R^2	0.922598	S.D. dependent var		5253.033
S.E. of regression	1461.460	Akaike info criterion		17.46621
Sum squared resid	1.45E+08	Schwarz criterion		17.59269
Log likelihood	-624.7837	F-statistic		283.0952
Durbin-Watson stat	1.817035	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/31/09 Time: 3:06; Sample: 1381:01 1386:12; Included observations: 72

Table 5a. Computational results for Khark Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1128.307	1015.483	1.111104	0.2706
PREPRICE	0.692194	0.071171	9.725791	0.0000
CAPITAL	-2.39E-09	9.64E-10	-2.483918	0.0155
P_E	431.2194	128.1388	3.365253	0.0013
DPS	0.042299	0.040890	1.034471	0.3047
EPS	0.687703	0.310589	2.214192	0.0303
R^2	0.895159	Mean dependent var		11689.31
Adjusted R^2	0.887217	S.D. dependent var		3919.905
S.E. of regression	1316.431	Akaike info criterion		17.28289
Sum squared resid	1.14E+08	Schwarz criterion		17.47261
Log likelihood	-616.1841	F-statistic		112.7050
Durbin-Watson stat	1.827228	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/30/09 Time: 22:12; Sample: 1381:01 1386:12; Included observations: 72

Table 5b. Computational results for Khark Company.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1440.599	970.0793	1.485039	0.1422
PREPRICE	0.706381	0.069874	10.10940	0.0000
CAPITAL	-2.13E-09	9.31E-10	-2.292190	0.0250
P_E	360.7564	108.5920	3.322127	0.0014
EPS	0.895150	0.237298	3.772262	0.0003
R^2	0.893459	Mean dependent var		11689.31
Adjusted R^2	0.887098	S.D. dependent var		3919.905
S.E. of regression	1317.120	Akaike info criterion		17.27120
Sum squared resid	1.16E+08	Schwarz criterion		17.42930
Log likelihood	-616.7631	F-statistic		140.4667
Durbin-Watson stat	1.842936	Prob(F-statistic)		0.000000

Dependent Variable: PRICE; Method: Least Squares; Date: 01/30/09 Time: 23:56; Sample: 1381:01 1386:12; Included observations: 72

$y= 0.706381x_1-2.13*10^{-9}x_2+360.7564x_3+0.895150x_5$

Conclusion

The regression model to forecast the stock prices for each of Iranian major petrochemical companies were developed. Having the amount of independent, we will be able to forecast the stock price of these companies (Sati et al., 1995). The models were run by E-Views software. As we evaluated in this methodology we should make our strategies based on calculated formulas in this paper and assign our limited budget to each petroleum company. For example, Farabi Company is not a suitable and productive one for future stock investment and not a good one for stock rising.

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