A Survey of the Relation between Tobin's Q with Earnings Forecast Error and Economic Value Added in TSE

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ABSTRACT
The investors mostly try to increase the return of their investment, to know when the stock is purchased and when is kept or sold makes them increase the benefits of their investment. Thus, the investigation of the relation between Tobin's Q and earnings forecast error and EVA in TSE was conducted that via empirical and scientific tests on the information during some years in TSE, useful solutions were provided by presenting good recommendations to the investors to achieve the highest returns in the similar periods. The present study was conducted to help the investors and stock holders to take decisions for trading in TSE. The study population was the companies listed in TSE during 2004-2010 as 454 companies with the following conditions:
1- The companies, their financial statement is on 3/31
2- The companies, their financial statement is on 6/31
3- The companies, their financial statement is on 8/30
4- The companies, their financial statement is on 9/30
Thus, 95 companies were excluded of the study population and 106 companies were selected as the study population and 636 data year were calculated to test the hypotheses for each variable. Finally, it was concluded that Tobin's Q had inverse relation with earnings forecast error but had direct relation with EVA.

INTRODUCTION
James Tobin introduced Tobin's Q as an index to predict whether the invested cash is increased or decreased. Q is one of the most important criteria of evaluation of the performance of the companies to Tobin. This criterion was proposed in 1971s and was applied extensively by the researchers in 1981s, 1991s. Tobin is dividing stock market value of the firm, ratio of any long-term liabilities plus the book value of short-term liabilities by replacement cost of the firm's assets. It can be said that common stock is standing stock of Tobin's Q and different types of securities being published. The ratio of Professor James Tobin was applied in economic analyses for future prediction of investment activities. If Q is above 1, additional investment in the firm would make sense because the profits generated would exceed the cost of firm's assets. If Q is less than 1, the firm would be better off selling its assets instead of trying to put them to use. According to Tobin, by the increase of replacement value of assets and equipment's, Q is reduced. Under such condition, the company instead of building or purchasing the equipment's and plants can own the other companies. The theory proposed by Tobin was famous among the economic and financial theorists of 1991s. Today, Tobin's Q is applied in the financial condition analysis of the companies. It means that the investors who purchase the stock of a company, at first calculate the Tobin's Q for the company. High Q value showed that replacement value of the plants and equipment's of the company was low and vice versa. Under equal conditions, the companies with high Q coefficient were suitable. He believed that this ratio can be applied to estimate the future investment cash and as a good index for general economy conditions. Tobin's Q model was presented by James Tobin and William Brainard (1968). They tried to explain how the financial markets organized the investment and how we can help an investor to find attractive and unattractive markets in terms of value. According to this model, if the value of a company is increased, more investment is made and if its value is reduced, its investment is reduced. If Q is less than 1, the company is faced with ownership and if Q is above 1, the company can invest because the market estimates its value more than its investment. In an interview with region (1996), James Tobin discussed...
about Q ratio:” I think this theory is a clear theory and it is not new. The Swedish economists as Viksel and Kins had the same ideas”.

Statement of the problem:
In the developed countries, one of the important economic indicators is stock market index. Due to the relative efficiency of information capital market, it affects the stock price rapidly but in Iran, capital market efficiency is weak. Despite all the shortcomings in the structure of TSE and the lack of familiarity of the household with financial investment, stock market is now one of the most attractive investment choices and the related studies can lead to the optimum allocation of resources in Iran economy. The investors achieve different benefits in stock market as dividend and increase of stock price. The investors use the financial information in the stock market for stock analysis. The earnings forecast error, earnings management, EVA, Tobin’s Q all are the main variables being considered by the investors and managers in capital market. The relation between the above variables is important for optimum allocation of the resources in the economy. On the other hand, accounting data should help the investors to predict the future events. The investors try to increase their investment returns. To define when the stock is purchased, held or sold help them to increase their benefits of investment. Thus, the investigation of the relation between Tobin’s Q and earnings forecast error and EVA in TSE was conducted that via empirical and scientific tests on the information during some years in TSE, useful solutions were provided by presenting good recommendations to the investors to achieve the highest returns in the similar periods. The present study was conducted to help the investors and stock holders to take decisions for trading in TSE.

Keywords and acronyms:
Economic Value Added (EVA):
EVA was developed by the management consulting firm Stern Stewart. It was claimed that earnings per share, earnings and earnings growth are deviating indices to evaluate the performance of the companies and it is the best indicator of measuring EVA. They believed that EVA had strong relation with creating wealth for the stock holders over time compared to any other indices. Journal “fortune” in October 1996 stated that EVA is replaced with the earnings per share.

EVA is one of the measurement criteria of performance and it shows the after capital costs earnings residual, (Weighted average cost of capital × Book value of capital) of operation earnings (Hejaz, 2007, p. 248).

Tobin’s Q:
James Tobin introduced Tobin’s Q as an index to predict whether the invested cash is increased or decreased. Q is one of the most important criteria of evaluation of the performance of the companies toward Tobin. This criterion was proposed in 1971s and was applied extensively by the researchers in 1981s, 1991s.

Earnings forecast error:
Earnings forecast error is one of the issues the can be effective in decision making of the investors to hold or delegate the stock. Purchasing the stock of new companies listed in stock market is more difficult than other companies because due to the lack of trading experience, the historical data of these companies is little (Fret, 1988).

The information asymmetry between the managers and potential investors is the most important issue faced by the investors in these companies. In such conditions, the companies are obliged to present the information the investors by which determine the stock price. The empirical evidences (Jog and Mac Conomy, 2003) showed that the investors rely on the data as earnings forecast of each share and applied it in stock pricing. This forecast for the investors for purchase, sell or holding the stock is based on the data.

Thus, earnings forecast error is an important factor in the performance of secondary market. Various factors affect.

The forecast accuracy of the earnings of the companies as:
✓ Company size
✓ Financial leverage
✓ Forecast time horizon
✓ company life
✓ Earnings changes

Study purpose:
The general purpose of the present study is the evaluation of the relation between Tobin’s Q and earnings forecast error and EVA in TSE.

Study questions:
Study hypotheses:
- There is a significant relation between Tobin’s Q and earnings forecast error.
- There is a significant relation between Tobin’s Q and EVA.

MATERIALS AND METHODS

This study was applied in terms of aim and correlation in terms of nature and content. The study was done based on deductive-inductive framework. The theoretical basic and review of literature via the library studies, articles and sites were deductive and data collection to support and reject the hypotheses was inductive.

Study population:
The present study population was all the companies listed in TSE during 2004-2010 as 454 companies. Based on the following assumptions, some of the companies were excluded from the study.
- The companies, their financial statement is on 3/31
- The companies, their financial statement is on 6/31
- The companies, their financial statement is on 8/30
- The companies, their financial statement is on 9/30

Based on item 1 to 4, 95 companies were excluded from the study population and among the companies with the end of fiscal year of Esfand 29, the companies with trading stopping more than 6 months and the companies didn’t present the required data to compute the study variables were excluded (selection of the sample companies among the study population was done by systematic elimination method). Finally 106 companies were selected as study population (the list of the sample companies is shown in the attachment) and for each variable, 636 data year were calculated for hypothesis test.

Study scope:
The study scope in terms of time, area and subject is as:

Subject scope:
The study subject: The evaluation of the relation between Tobin’s Q and earnings forecast error and EVA in TSE.

Time scope:
The present study time was 6 years, 2004-2010.

Area scope:
The study area is the companies listed in TSE.

Results:

Study variables:

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<td>2</td>
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Study model and measuring method of the variables:

The data in the present study was extracted of the financial statements, attached notes of financial statements and initial data of stock board (collected in Tadbirpardaz, Rarhavardnovin and data bank of statistics department of stock company).

Study variables and their calculation method:
a. Tobin's Q: It is the sum of the market value of the companies 10 days before stock earnings declaration (short-term assets of the firms - short term debts) + (Book value of the firms - long term debts) divided by book value of firm's total assets. (Roger and Ranold best, 2002, p. 365).

Tobin's Q is calculated as:

\[
Q = \frac{|MVE + PS + DEBT|}{TA}
\]

Where:
- MVE = is the market value of the firm 10 days before stock earnings declaration
- PS = liquidating value of the firm's outstanding preferred stock
- DEBT = (Firm’s short term assets - short-term debt) + (firm’s book value - long term debt)
- TA = Book value of firm’s total assets

b. The forecast error of standardized earnings: It is obtained by the difference between the real earnings minus predicted earnings divided by stock price on the final year of fiscal year (Roger Beth and Ranold Beth, 2002, p. 364).

To standardize the earnings forecast error, Roger G Beth and Ranold Beth (2002) was used.

Standardized forecast error

\[
FE = \frac{|YEPS_{t-1} - FORE_{t-1}|}{P_{t-1}}
\]

Where:
- T-1 = It indicates the fiscal year before stock earnings declaration.
- YEPS_{t-1} = Average income forecasting at the end of fiscal year t-1
- P_{t-1} = Stock price at the end of fiscal year t-1

To test the hypotheses of the study, correlation analysis and its coefficients and equality test of the significance of some correlation coefficients.

As it was said in the study, to test the hypotheses, correlation coefficient was used and to describe the relation between the study variables to each other, adjusted coefficient of determination was applied. To investigate the explanatory power of the variables, it is presented for total regression model. To determine the probability of using regression line equation and generalizing the results of the sample to the population, significance of correlation coefficient is tested and t-test was used. If the calculated t is more than the values in the table at confidence interval 95 to 99%, it means that the obtained correlation coefficient is considerable and it is not possible it is arise of random changes and the result is generalized to the population.

\[
t = r \sqrt{\frac{n-2}{1-r^2}}
\]

Where:
- T: Test statistics
- r: Correlation coefficient
- N: The number of samples
- r^2: The coefficient of determination

The analysis of the study hypotheses:

The researcher after the determination and computation of the independent and dependent variables, tested the hypotheses and analyzed them. At first, the correlation relation of the independent variables was tested and then regression method was used to determine the math relation between independent and dependent variables. Indeed, regression analysis helped to find the linear relation between the variables. Finally, to determine the
relation between independent and dependent variables, correlation criterion was used. Fortunately, to avoid the calculation of the corresponding statistics of table $t$, SPSS software calculated the probability and it can be used to support or reject the null hypothesis. The summary of the findings of each hypothesis is as following:

The study of the normality of the variables:
As the normality of the dependent variable leads into the normality of model residuals, before model processing, its normality is controlled.

Null hypothesis and $H_1$ of normality test are as:

$H_0$: The data distribution is normal
$H_1$: The data distribution is not normal

To test the above hypothesis, Kolmogorov-Smirnov test was used. In this test, if significance level is less than 5%, null hypothesis is rejected at confidence interval 95%. As significance level in the variables was greater than 0.05, $H_0$ is supported and $H_1$ is rejected. In other words, the data had normal distribution. Thus, the normality hypothesis of the variables of the study was supported.

Test hypothesis:
Hypothesis 1: There was a significant relation between Tobin’s Q and earnings forecast error.
Hypothesis 2: There is a significant relation between Tobin’s Q and EVA.

$H_0$, $H_1$ are defined as:

$H_0$: There is no significant relation between Tobin’s Q and earnings forecast error (EVA).
$H_1$: There is a significant relation between Tobin’s Q and earnings forecast error (EVA).

To test the hypothesis by this index, the test result has four outputs.

First output:
The entered independent variables investigated the eliminated variables and the method in determining the regression.
Enter method is an approach in selection of the variables in which all the entered variables are used in determining the regression in one stage.

Second output:
Correlation coefficient investigated the coefficient of determination and Durbin-Watson test between the independent and dependent variables. In this output correlation coefficient between Tobin’s Q as independent variable and earnings forecast error and EVA as dependent variable was 0.224, 0.316, respectively. The coefficient of determination (the change in dependent variable that can be explained by regression) presents the adjusted coefficient of determination and estimation criterion error. Durbin-Watson test statistics was 1.640, 1.855, respectively being in the range 1.5 to 2.5. The non-autocorrelation assumption between the errors is not rejected and the regression is used.

Third output:
It is consisting of regression variance analysis to investigate the absoluteness of the linear relation between the variables.

The study hypotheses of significance test of total regression model are as:

$H_0$: There is no linear relation between two variables
$H_1$: There is a linear relation between two variables

In this output, significance level was less than 5% and linearity assumption supported the relation of two variables. The results of this output are $F=41.279$, $F=53.179$ and significance level was 0.000 for both of them, and less than 0.05. Thus, at level $\alpha=0.05$, there was a significant relation between dependent variable (earnings forecast error and EVA) and independent variable (Tobin’s Q). F statistics is obtained of dividing the mean of regression squares by the mean of residuals squares. F statistics showed the significance of regression at confidence interval 95%. Thus, $H_0$ is rejected and the significant relation between Tobin’s Q and earnings forecast error and EVA is supported.

Fourth output:
The regression equation coefficients of dependent variable of the tests of each of the regression coefficients, one of the real tests of the hypotheses about the model parameters were used to measure the regression model. To investigate the significance of the independent variables, t-statistics was used. T-statistics for the variable
(Tobin’s Q) was significant at confidence interval 95%. Variance Inflation Factor (VIF) of all the values was less than 5 and it showed the non-linear relationship between the independent variables. Coefficients (B) are the constant value and independent variables coefficient in regression equation and the regression equation is as:

A) \( FE = -3.292 - 0.279Q \)
B) \( EVA = 9.755 + 0.610Q \)

Based on t-statistics, there was an inverse relation between Tobin’s Q and earnings forecast error and there was a direct relation with EVA. The higher the Tobin’s Q, the less the earnings forecast error and the more EVA and vice versa.

Chart 1- Histogram of regression standardized residuals with dependent variable of earnings forecast error

Chart 2- Histogram of regression standardized residuals with dependent variable of EVA

Based on charts 1, 2, the present mean in the right side (close to 0) and standard deviation was close to 1. The standardized residuals were normal

Fig. 3: The distribution of the standardized values with dependent variable of earnings forecast error
Conclusion:

The result of first hypothesis test: There is a significant relation between Tobin’s Q and earnings forecast error.

Based on the tests and analyses conducted by regression and correlation, there was a positive correlation coefficient between Tobin’s Q and earnings forecast error in the companies listed in Iran capital market and it is equal to 0.224. F-statistics is 41.279 and significance 0.002 showed the significance of the regression at confidence interval 95%. Thus, H0 is rejected and the relation between Tobin’s Q and earnings forecast error is supported. T-statistics values showed the significance of Tobin’s Q coefficient. There was an inverse relation between independent variable (Tobin’s Q) and earnings forecast error based on t-statistics. It means that by the increase of Tobin’s Q in a company, it is probable that the earnings forecast error is reduced and if the Tobin’s Q is reduced, the earnings forecast error is increased. The investigations showed that the above hypothesis is supported and there is a linear and negative relation between Tobin’s Q and earnings forecast error.

The result of second hypothesis test: There is a significant relation between Tobin’s Q and EVA.

Based on the tests and analysis of regression and correlation, it can be said that there was a positive correlation coefficient between Tobin’s Q and EVA in the companies listed in Iran capital market and it is equal to 0.316. F-statistics is 53.197 and significance 0.000 showed the significance of the regression at confidence interval 95%. Thus, H0 is rejected and the relation between Tobin’s Q and EVA is supported. T-statistics values showed the significance of Tobin’s Q coefficient. There was a direct relation between independent variable (Tobin’s Q) and EVA based on t-statistics. It means that by the increase of Tobin’s Q in a company, it is probable that the EVA is increased and if the Tobin’s Q is reduced, the EVA is reduced. The investigations showed that the above hypothesis is supported and there is a linear and positive relation between Tobin’s Q and EVA.

The general evaluation of the results of hypothesis test:

Tobin’s Q had inverse relation with earnings forecast error but it had direct relation with EVA.

Some recommendations based on the results of the study:

The recommendation based on the results of hypothesis 1: Based on the results of the first hypothesis on “There is a significant relation between Tobin’s Q and earnings forecast error” and it was supported. It is recommended to the stock holders and other investors take decisions about achieving high returns about the companies with more Tobin’s Q and low earnings forecast error and the companies in which Tobin’s Q is low and earnings forecast error is high. Also, the investors and analysts who consider the forecast earnings as one of the decision making factors based on the results of this hypothesis, consider the relation between earnings forecast error and Tobin’s Q.

The recommendation of the results of second hypothesis: Based on the results of second hypothesis on “There is a significant relation between Tobin’s Q and EVA” that is supported. It is recommended to the stock holders and other investors take decisions about achieving high EVA based on the increase and decrease of the management about the companies with more Tobin’s Q and high EVA and the companies in which Tobin’s Q is low , EVA is low.

REFERENCE