Investing the effects of Tobin’s q ratio and operating growth rate on the level of investment in the chemical industry

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Abstract

Investment is one of the most important components of aggregate demand and plays a crucial role in economic growth and fluctuations of a country; therefore investment behaviour have been highly regarded by economists and economic policy makers. Accordingly, theorists have long been trying to develop a model to explain investment behaviour and identify its important factors. On the other hand, the importance of managers’ performance measurement is concerned by accountants. Profits in the short – term and increasing the wealth of shareholder in long – term are one of the main objectives of businesses.

This matter becomes possible with making the most logical decision in the investment process. Marking the most logical decision has a direct relationship with evaluating the performance of enterprises and the evaluating the performance of enterprises needs appropriate criteria recognition and financial indicators. Therefore, the aim of this study was to investigate the effect of Tobin’s q ratio as an indicator for long – term investment opportunities and income growth ratio as an indicator for short – term investment opportunities on the level of investment.

Keywords: Rate of operating profit growth, investment, q Tobin ratio.
Introduction

Investigating the theories related to investment reveal the reason of Tobin’s q ratio and income growth rate influence on the level of firms’ investment. The investigation of these theories is very important for any firms in identifying and enjoying from good indicators of performance evaluation, profitable investment opportunity and the optimal investment. The following relation shows the optimal investment process in easiest way:

Low investment $\rightarrow$ optimal investment $\leftarrow$ more investment

Information asymmetry makes multiple contrasts (eg, separation of management from ownership) between the main stakeholders that lead to Low or more investment process. Low investment indicate the failure of firm in choosing performance evaluating indicators and identifying investment opportunities and therefore leads to the reduction of profit and losing future investment opportunities. More investment indicates that the firm doesn’t have proper performance in identifying profitable investment opportunities and the firm has invested more than optimal level, so the costs and expenses have increased and the profitability has been reduced. When the firm becomes near to optimal investment level, the profit is increased and when it exceed from optimal investment level, the profit is decreased. The more and low investment hypothesis explain that the firms with investment lower than optimal level suffer from the low investment problem and the firms with investment higher than optimal level suffer from the more investment problem. According to this hypothesis, the existence of cash flow due to the information asymmetry between managers and shareholders leads to more investment and in the other hand the existence of limitation in financial supply leads to low investment.

The purpose of this study was to investigate the effects of Tobin’s q ratio and growth rate of operational profit on the level of investment in chemical industry. In this research, we want to affirm or reject this hypothesis that whether Tobin’s q ratio and growth rate of operational profit effect on investment level in chemical industry. The research approach is applicable in goals point of view and is correlation research in the type of research point of view. The statistical population of this study were the firms were admitted in Tehran Stock Exchange at the field of chemical industry during 2008 to 2014 years. The database of Exchange organization was used to variables calculation.

The Excel, SPSS and Eviews Soft ware’s were used to statistical analysis and estimate of $\alpha$, $t$ parameter and the linear regression of OLS was used to test the study hypothesis and according to data gathered by software, the $p$ – value significantly test was used to investigate the level of research variables. The investment process needs to analysis the nature of main investment decision – making. In this study, the activities related to decision – making were analyzed and the most important factors effect on the decisions of investment activity environment was investigated.

The firm’s managers can create efficiency by recognizing effective factors of investment and using them to reach the optimal level of investment. According to the useless investment hypothesis, the trend of managers to more investment is one of the factors that lead to
acceptation of projects with negative NPV and therefore the separation of ownership from managers. With the information symmetry between inside current cash flow and natural value of firm assets, sudden exposition of new stock will indicate the high of programmed investment. With the forming new subject related to management separation from ownership and the creation of a great opposition between managers and shareholders, the evaluation of managers and firms becomes very important in financial decision – making. There becomes very important in financial decision – making. There are various criteria and methods in financial dimension that are included:

A. The methods use accounting information to evaluate performance and are financial ROE, ROA and … ratios. The limitation of this method are:
   1. The high possibility of retouch due to the multiplicity usage of different accounting approaches.
   2. Relying on Limiter principles and approaches.
   3. Inexistence of providentially and attention to factors such as time value of money and soon.
   4. Don’t paying attention to factors which create value such as insensible assets.

B. Methods that use a combination of market and accounting information to evaluate the performance such as various versions of Tobin’s q and …. the advantages of performance evaluation with Tobin’s q ratio are:
   1. Sampling in understanding for users and financial analysis
   2. Facilities for access to required information for Tobin’s q ratio estimation.
   3. Its estimation is very easier in Iran due to the lack of bonds and issued preferred stock.
   4. It is a criterion based on market information and doesn’t have the weakness of criteria are based on accounting profit.

C. Ratios are used by financial management data such as returns of per share and excess returns of per share

D. Ratios use accounting information but are economic criteria such as EVA, MVA and REVE.

James Tobin performed many studies and researches about various economic topics in 80 decade. He was an economist that considered pro – Keynes more than anyone else in the US, because not only didn’t joint to fans of money school, but also in a consistent manner defended from the idea that Keynes theory was able to resolve the economic problems of the 1980s.

He won the Nobel prize of 1981 for his important theoretical works about the sensitivity of money demand against interest rate changing, his experimental studies in the field of consumption and saving, his analysis about the effects of financial variables on decision making about cost and expense, his endeavour for considering money and commercial courses in economic growth model, his criticism about the rhetorical from work of Milton Friedman’s money theory and his defence from demand management against the negative results of (( new macro economy )). He also gained numerous honorary degrees like((John Bites Clark)) medal from American economists community in 1955, He as the head of Economy Investigation Community of US in 1985 and the head of Economist Community of US in 1971 and was gained honorary doctrine degree from five universities of American and
Europe. The asset conservation is located in Tobin research center. The members of community can conserve money, bond and stock bond. These three types of asset have divided to money and bond in economy measurement models point of view.

Kinz in his book’s the general Theory has supposed that bonds and share are substitutable and therefore don’t different in investor point of view. Tobin rejects this hypothesis and concluded that the effect of money policy and real income cannot be judged only by interest rate. The reduction and increasing of money value cannot be measured by interest rate changing but the return rate in which investors’ trend to buy bond and stock should be attention. Generally, the relationship between assets and liabilities of business firms based on current market price and replacement cost of assets of these firms based on current price is the final criterion of increase and decrease of demand. Tobin has named the relation of these two variables as a q ratio.

Tobin in his article in 1958 argued that investors should select mean efficiency or scattering efficiency of investment. The efficiency of financial assets depend on interest rate and increase and decrease of asset value, therefore the assets efficiency is measured by returns mean and the investment selection included the combination of money, bond and shares which performed according to the trend of investor with high mean and low distribution compared with low mean and high distribution. The Tobin theory has been used in the balance of assets combinations for money demands and other assets since 1958.

Among the researches have been performed in this field, it can point to the work of Jjahankhani and knani Amiri in 2006 that provided a model for the level of investment expanse. The researchers of this study gave found that the sensitivity of firms’ investment to Tobin’s q ratio is very high.

Another study in this field is Namazi and Zeraatgari in 2009 that investigated the Tobin’s q ratio in Exchange organization. This study was conducted in three general parts and with following purpose: 1) the investigation of q ratio application as an evaluation criterion of performance in admitted firms of Tehran stock Exchange: 2) the investigation the relationship q ratio with other criteria of performance evaluation and 3) the comparison of q ratio in different industries.

A five years period (2007-2006) was considered in order to access to higher goals. The statistical population were all of firms were admitted in Tehran stock Exchange. The used methods were Pearson correlation coefficient, Laniary Regression, variance analysis and T-test.

The results showed that Tobin’s q ratio has not been used in firms admitted in Tehran stock Exchange. In addition, q ratio has significant relationship with share price, asset returns and the profit per share criteria and doesn’t have any significant relationship with asset flow, remained profit, selling growth, profit growth, operational profit and selling profit criteria. In investigating Tobin’s q ratio in different industries, it was found that automotive industry has the highest level of Tobin’s q ratio and textile industry has the lowest level of Tobin’s q ratio. The study of Kau et al (2002) showed that there is a direct significant relationship between profit dividing policy, cash flow and the level of investment. They have showed that cash flow, Tobin’s q ratio, income growth rate, divided and declared profit and asset changing
effect on the level of investment. Wolf investigated the q ratio in 2003. He explained that there are many economic indexes for performance evaluation of firms that among them, Tobin’s q ratio can be used as a index for evaluation of firm performance in investment. Nitra and Sirini and Assen have confirmed relationship between Tobin’s q ratio and investment return (ROI), in their investigation in 2005. Lorenz and Vinton have confirmed a reasonable relationship between Tobin’s q ratio and income growth rate with investment in their study about the relation of Tobin’s q ratio, income growth rate and investment, in 2007. Frank has confirmed a negative significant relationship between Tobin’s q ratio and investment and a positive significant relationship between income growth rate and investment in his study about Inside growth, external growth, Tobin’s q ratio, income growth rate and investment diversity.

Investment is one of the most important elements of total demand which plays an important role in the economic growth fluctuations of a country. Therefore, the recognition of investment behaviour is very intentioned by economical policy. According to this matter, the rhetoricians have long tried to provide a pattern to explain the investment behaviour and identify the most important factors effect on investment. In the other hand, measurement of manager performance is important for accountants. Practically, a large number of firms use the most important variables like sell, profit and profit/sell rate to measure the manager’s performance in traditional ways. But this methods are not proper to measure managers performance because the profitability of an unit has a close relationship with the amount of investment and none of traditional methods don’t pay attention to the level of investment (Namazi, G, 200). Due to the traditional objections, recently a Tobin’s q ratio is posed as an important index in the performance evaluation of economical firms and managers (Wolf, 2000). It is a statistical ratio which can be a value agent for firm to investors (Namazi, So, 2009).

The Model of study

<table>
<thead>
<tr>
<th>Independence variables</th>
<th>Dependence variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobin’s q ratio</td>
<td>The level of investment</td>
</tr>
</tbody>
</table>

This research is a correlation description research. In description researches, the relationship between variables is analysed according to the aim of research. We have used the regression analysis in this research.

Since the volume of our population was 54 firms, so the volume of our sample was those 54 firms.
In this study, we have presented demographic information and results by using discretional statistics tools and have used statistical tests to investigate posed hypothesis in order to acceptance or rejection them by SPSS 18 software.

**Dedicalional analysis of data**

The SPSS software was used to perform statistical analysis. At the beginning, it was required to determine the normality or abnormality of distribution in each under study variables. The K-S test was used for this purpose. The correlation test was used to investigate the significantly relationship between variables, after K-S test. The Pearson correlation test was used when the distribution was normal and the regression correlation test was used when the distribution was not normal.

**The test of data normality**

As it mentioned before, the K-S test was used to investigate the variables normality. This test was performed at the significantly level of 0.05. the hypothesis of variable normality is rejected, if the amount of significantly or P-Value is equal or less than 0.05 and there is no reason to reject the hypothesis if the amount of P-Value is higher than 0.05. The results of this test have reported in following table.

Since the hypothesis of normality was rejected for most of variables based on the results of K-S test, the non-parameter correlation test of Spear man was used to investigate the relationship between variables.

<table>
<thead>
<tr>
<th>First Hypothesis</th>
<th>Second Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>With the level of investment</td>
<td>Tobin’s q ratio</td>
</tr>
<tr>
<td>N</td>
<td>54</td>
</tr>
<tr>
<td>Z</td>
<td>1.894</td>
</tr>
<tr>
<td>Sig results</td>
<td>0.002</td>
</tr>
</tbody>
</table>

**Correlation test**

Since the hypothesis of normality was rejected for some variables of study, the regression correlation test was used to investigate the relationship between variables. At first, the correlation coefficient, determination coefficient and Watson – Camera test between independence and dependence variables were investigated for each hypothesis.

**The main hypothesis**: The Tobin’s q ratio and growth rate effect on investment level in chemical industry.
The statistic of Watson – Camera test was equal to 2.098 and located in 1.5 to 2.5 ranges, therefore the hypothesis of correlation existence between errors was rejected and it can be used from regression test. 

The analysis of regression variance (ANOVA) of independence and dependence variables

<table>
<thead>
<tr>
<th>model</th>
<th>Sum of square changing</th>
<th>Degrees of freedom</th>
<th>Mean of Square changing</th>
<th>F statistic</th>
<th>The level of significantly</th>
</tr>
</thead>
<tbody>
<tr>
<td>regression</td>
<td>2780.976</td>
<td>1</td>
<td>2780.976</td>
<td>47.236</td>
<td>.000^a</td>
</tr>
<tr>
<td>remained</td>
<td>14895.213</td>
<td>253</td>
<td>58.874</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>17676.190</td>
<td>254</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The F statistic was obtained by dividing square mean of regression in remained square means. The F statistic was equal to 47.236 and indicated that the significantly of regression was at the confidence level of %95. The obtained P – Value validated this argument. Therefore the null hypothesis (H0) was rejected and the significant relationship of Tobin’s q ratio and operational growth rate with the level of investment was validated.

The coefficients of regression relation of independence and dependence variables

<table>
<thead>
<tr>
<th>model</th>
<th>Symb ol</th>
<th>Non standardized coefficients</th>
<th>Standardized coefficient</th>
<th>T statistic</th>
<th>The level of signifi Co linearity Statistics</th>
</tr>
</thead>
</table>

^a
As the model showed, the coefficient of Tobin’s q ratio (A) indicated the direct (positive) relationship of this variable with the staffs investment growth rate (T).

Hypothesis 1 – investigating the relationship of Tobin’s q ratio with the level of investment in the firms of chemical industry

The analysis of regression variance (ANOVA) of independence and dependence variables

The F statistic was obtained by dividing square mean of regression into remained square means. The F was equal to 16.18 and indicated that significantly of regression was at the confidence level of %95 and the amount of P – Value validated this argument. Therefore the H0 hypothesis was rejected and the Tobin’s q ratio had a significant relationship with the level of investment.

The null hypothesis (H0) stated that there is not any significant relationship between Tobin’s q ratio and the level of investment in the firms of chemical industry and according to H1 there is a significant relationship between Tobin’s q ratio and the level of investment in the firms of chemical industry.
The coefficients of regression relation of independence and dependence variables

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Non Standardized coefficients</th>
<th>Standardized coefficients</th>
<th>T statistic</th>
<th>The level of significantly</th>
<th>Co linearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>standard error factor B-column</td>
<td>Beta</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>4.896</td>
<td>.644</td>
<td>7.602</td>
<td>.000</td>
<td>Tolerance 1.000 Variance inflation factor 1.000</td>
</tr>
<tr>
<td>A</td>
<td>6.191</td>
<td>.675</td>
<td>.278</td>
<td>9.172</td>
<td>.000</td>
</tr>
</tbody>
</table>

\((T) = 4.892 + 6.191 (AR)\)

As the model showed, the coefficient of Tobin’s q ratio (AR) indicated the existence of a direct (positive) relationship between this variable and the amount of investment \((T)\).

Hypothesis 2: the investigation of Tobin’s q ratio relationship with the level of investment in the firms of chemical industry.

The analysis of regression variance (ANOVA) of independence and dependence variables

<table>
<thead>
<tr>
<th>model</th>
<th>Sum of square changing</th>
<th>Degrees of freedom</th>
<th>Mean of Square changing</th>
<th>F statistic</th>
<th>The level of significantly</th>
</tr>
</thead>
<tbody>
<tr>
<td>regression</td>
<td>17524.067</td>
<td>1</td>
<td>1684.986</td>
<td>24.124</td>
<td>.000</td>
</tr>
<tr>
<td>remained</td>
<td>1771.123</td>
<td>253</td>
<td>69.846</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>19295.190</td>
<td>254</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The F statistic was equal to 124.24 and the amount of P – Value indicated that the significantly of regression was at the confidence level of %95. Therefore the null hypothesis
was rejected and there was a significant relationship between operational profit growth rate and the amount of investment in the firms of chemical industry.

\[(T) = 11.308 + 9.217 (AT)\]

As the model showed, the coefficient of operational profit growth rate \((AT)\) indicated the direct \((AT)\) indicated the direct (positive) relationship of this variable with the level of investment.

**Conclusion**

In this study, the relationship of Tobin’s q ratio and operational profit growth rate with the level of investment in the firms of chemical industry was investigated by considering the admitted firms in Tehran Stock Exchange.

In this way, the required data to measure the hypothesis of study was gathered from information presented by bond STOCK Exchange organization which included 54 firms and then was analysed.

For this purpose, the K-S test was used to investigate the normality of distribution in each of under study variables and the correlation regression test was used, due to the abnormality of data.

The results of statistical analysis to acceptance or rejection of research hypothesis were as follow:

Hypothesis 1: the investigation of Tobin’s q ratio relationship with the level of investment in the firms of chemical industry.
The variance regression analysis showed that there is a significant relationship between Tobin’s q ratio and the level of investment in the firms of chemical industry. In the other word, it can be stated that the direct increase effect of Tobin’s q ratio on the level of investment in the firms of chemical industry was validated.

Hypothesis 2: the investigation of operational profit growth rate with the level of investment in the firms of chemical industry.

The results of variance regression analysis showed that there is a significant direct positive relationship between the operational profit growth rate and the level of investment in the firms of chemical industry. According to this findings, the increase of operational profit growth rate play on important role in the level of investment in the firms of chemical investment. According to above information, it can be conclude that in the firms of chemical industry, the increase of operational profit growth rate and Tobin’s q ratio (as a index to show long – term investment opportunities). The data of this research allowing more precise analysis for component of the overall stock market analysts or investors to study Exchange Changes and avoid risky investments by using this information.
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