The effect of competition in the market and the cost of research and development on stock returns in companies listed in Tehran Stock Exchange

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Abstract

The aim of this study was to investigate the effect of competition in the market and the cost of research and development (R & D) on the company's stock returns. The study in terms of the relationship between variables is causal, and in terms of the goal is applied and descriptive survey in which to approve or reject hypnosis, historic data and statistical methods were used.

To test the hypothesis of this study, panel data is used to estimate the model. The population was data from 102 companies over the years 2009 to 2014. In this study, descriptive and inferential methods were used to analyze the data. This research is done using causal-comparative approach.

In descriptive level, using statistical characteristics general characteristics are described and in inferential level in order to respond to hypotheses and to find a special relationship between the variables regression analysis tests, T-test and F-test were used. In addition, to test the hypotheses of Eviews 9 statistical software was used.

The results showed that the first and second hypothesis, research and development expenses and market competition of product with stock returns were approved. The third hypothesis was not approved: there is no significant relationship between R & D expenses and stock returns in companies with high competition.

Keywords: The size of the product market, the cost of research and development, stock returns.
1. Introduction

Usually the most important criterion for evaluating the performance of institutions is the rate of return on stocks. This measure alone has information content to investors and is used to evaluate the performance. When it reduces, it is a warning for the companies and shows that companies’ performance is not good. This criterion has high information content, because the performance evaluation based on market value, shows investors information very well. Returns in the investment process are the driving force that motivates and is considered as a reward for investors. The total return are the benefits that are awarded to the share during the year.

2. Background and hypotheses

2.1. Scholarly record: Eliasiet al (2015) examined effect of corporate governance and market competition on the analytical prediction in the Brazilian market and found that companies’ coverage in market competition is stronger and more accurate with corporate governance, Castellani and Pieri(2013)examined the overflows of research and development on European productivity growth. Overflow increase in technology in countries, increase concerns of developed countries about reduction of knowledge and competition in these countries. On the other hand, importance of economic growth requires that this process continue through technology transfer and further growth in euro area countries. According to the results of this study, the recipient areas of technology overflows, had higher productivity growth, but this positive impact decreased by increasing the number of projects conducted outside of the area. A significant and positive relationship between R & D overflows expansion and domestic productivity growth area, proves that foreign R & D increase internal competition of European regions regarding the productivity growth. Kampelmann and Ryex (2012) in Belgium for two terms of 1999-2006 evaluated the overall productivity of factors of production in workshops with more than 10 workers and concluded that high level of education has a significant and positive impact on productivity of company and surplus of education among the young staff of same age increases the efficiency of the organization.

Dogarawa (2011) examined the impact of higher education on the productivity of labor and wages of individuals in the state of Kaduna. Results of the investigation indicated a positive impact on productivity and the labour but minor positive impact on the wages of individuals. Dogarawa finally, recommended that to increase productivity and the wages governments need more incentive policies to encourage workers to higher education.

Khodadai and Rashid (2014) found that by increasing product market competition, dividends reduced. Therefore, companies pay fewer interests in focused or competitive markets because they need to save money to deal with the threats and malicious behavior of competitors.
Khoddami Pour and Barzayi (2013) found a significant positive relationship between product market competition and quality of disclosure.

In addition, indicators of product market competition had no significant impact on the relationship between board independence and quality of disclosure. Ghorbani et al (2013) also found that the competition in the product market has strategic effect and has a U-shaped relationship with quality of information disclosure. In addition, product market competition does not improve and strengthen the relationship between the Non-bound members of board of directors and quality of disclosure.

Mohammad Zadeh et al (2012) examined the factors affecting R & D activities, its intensity and efficiency and showed that human capital, firm size and type of ownership can enhance research and development activities that are of important resources of productivity Research and development activities in firm has a positive relationship with firm size, non-state ownership of firms, human capital, and profitability and industry concentration. However, the intensity and efficiency of these activities only is dependent upon human capital with higher education.

2.2. The research hypothesis: To determine the relationships between variables two hypotheses are as follows:

The first hypothesis: there is a significant relationship between research and development expenditure and stock returns.

The second hypothesis: There is a significant relationship between product market competition and stock returns.

The third hypothesis: In companies with high competition between there is a significant relationship between research and development expenditure and stock returns.

Research methodology

Scientific research can be divided into several types in term of the purpose, nature and methods. Based on purpose of research, include fundamental research, applied and practical. Fundamental research take place regardless of application of results and just expand the frontiers of knowledge: Fundamental research are divided to pure and strategic ones. Pure fundamental research, take place regardless of scientific application of results and aim to expand the frontiers of knowledge. Strategic fundamental research is done to provide necessary scientific background to solve the current and future problems. Applied research are done based on knowledge derived from research or experiments for the deployment of methods, theories and models available to provide an analysis of a phenomenon that may lead to finding a solution. Practical or experimental research are all regular activities based on existing knowledge gained from research or experience for the production of materials, products, tools, processes and new methods or to
improve them. This type of study, are called or problem solving research or applied research because their results directly are used to solve a particular problem (Momeni and Adel Azar, 2002). With respect to research and aforementioned issues, this study is applied in term of the purpose, descriptive in term of method and in term of time dimension is also a post-event research.

3. Data collection and sampling.

Scientific research in terms of data collection are divided into three categories of laboratory-experimental, field studies and survey:

A) laboratory-experimental: the main feature of laboratory experimental method is precise control of data and research plan through the elimination or control the confounding variables. The internal validity is usually at the highest possible degree.

B) A field study: In the field study, control of confounding variables is difficult. Data collection is done in real and natural environment, therefore in the field study, external validity and applicability of the results is higher. On the other hand, the low degree of control makes the extraction of theory and causal interpretation difficult. It belongs to Quasi-experimental research.

C) Survey: it is the most common method of collecting data, and includes interview and questionnaire methods.

According to presented issues, in part of variables, extraction of the necessary variables to be used in models to test hypotheses and their resources are expressed. Initial data related to the variables is derived from financial statements and the accompanying notes by Tadbirpardaz software. In addition, for extraction of other information needed, CD of stock exchange of official site of the Tehran Stock Exchange is used. For theoretical foundations, library method is used and related books and articles were studied.

The companies surveyed are those listed on the Tehran Stock Exchange. Because this information is available in Stock exchange on CD-ROMs and under id control of responsible institutions. Hence, there is a particular sensitivity on the company's financial statements. Considering that it is necessary to audit the financial statements of these companies, the quality of information appears to be more accurate. This research is performed on companies listed in the Tehran Stock Exchange.

The present study was done in 2009-2014 years because during this period all information about research and information about the companies was available. Time scope means, period of time that researcher in his study uses data during that period.
Investigations are conducted to identify and predict a phenomenon in a population. To obtain an understanding of the phenomenon, samples of the population are analyzed then the results are generalized to total statistical population.

The population of study are listed companies in Tehran Stock Exchange during 2009 (1388) to end of 2014 (1393) for a period of 6 years. During this period, they have maintained their membership on the stock exchange. To achieve reliable results companies that listed in stock exchange after these years or are excluded from list during the study are not considered in population. 102 companies had all conditions to be in the population.

2.3. The research model and measurement of variables of return on stock is defined as the following model. To calculate returns on stock Fama–French model was used, which is as follows:

\[
RET_{it} = \alpha_0 + \alpha_1 MKT_{it} + \alpha_2 SMB_{it} + \alpha_3 HML_{it} + \epsilon_{it}
\]

Where

RET stock returns: Companies total stock cash and price return

MKT Return of market value minus the risk-free rate in a month

SBT: size of company: the natural logarithm of total assets


The dependent variable: in this model is return on stock is dependent variable

The independent variable: In this model, competition in market is the independent variable

Control variables: in this model, growth opportunity is control variable

To test the impact of competitiveness of products and research and development investment and stock returns following model was used.

In this model

\[
RET_{it+1} = \alpha_0 + \alpha_1 HHI_{it} + \alpha_2 R&D_{it} + \alpha_3

H - HHI * R&D_{it} + \alpha_4 MTB_{it} + \epsilon_{it}
\]
RET stock returns: Companies total stock cash and price return

HHI is market competition; is calculated based on Herfindahl-Hirschman index

R&D is research and development expenses: Total expenses on research and development that is abstained from notes accompanying the financial statements.

H-HHI : Hi competitive market: is an imaginary variable that if market competition was higher than normal is considered 1 and if not is 0.

MTB: growth opportunity: equals to ratio of stock market value to book value of stock

Competition in the market is measured based on Herfindahl-Hirschman index, which was used in research Rondy and Jensen (2004), Hou and Robinson 30 (2006), Girod and Muller(2011), Bion et al. (2011) and Setayesh and KargharFard (2011). It should be noted that this index calculates the amount of competition in different industries and is defined as follows:

\[
\text{Index(HHL)} = \sum_{i=1}^{n} \left( \frac{S_i}{S} \right)^2
\]

Si: Returns on sale of i company

S: Total returns on sale of companies in industry that i company is involved in.

n: the number of companies in concerned industry

4. Findings and data analysis

Often the most useful and also the first step in organizing data, is to sort data based on logical criteria then central and dispersion parameters need to be extracted. In a brief, using descriptive statistics method, we can precisely express the characteristics of information. Descriptive statistics is always used to determine and express the characteristics of information.

So, in this section descriptive statistics of variables used in the study will be examined that is provided in table (1). The values provide an overview of the status of research data distribution. In this section, data on 102 companies in period 2009-2014 is reviewed. With the integration of data, the total number of observations was 338.

Table 1-4 shows descriptive statistics of variables used in the model.

Table 1. Results of descriptive statistics of variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Max</th>
<th>Min</th>
</tr>
</thead>
</table>

http://www.ijhcs.com/index.php/ijhcs/index
Evaluation of quantitative results of descriptive statistics of variables according to figures represents 0.1546 values for stock returns, which reflects relatively limited efficiency of the companies.

Mean of market value to book value variable respectively are 0.6237 and 0.0615. In other words, companies have growing opportunities that a part of this growth is due to price changes and returns of companies over the course of the study. Statistics of standard deviation, coefficient of skewness and kurtosis are used to verify the normal distribution of data (Keler and Varak, 2003). By examining the above mentioned criteria, it can be stated that the data on independent and dependent variables are normally distributed because variables had a minimum distance of values provided for skewness. Volos (2002) stated that when the size is larger than 100 (approximate standard for normal distribution) the probability of normality of the data increases.

Hypothesis testing

Table (2) shows the estimations on parameters of model (1). For this model Durbin - Watson statistic is equal to 2.3322 that at the 5% level autocorrelation is rejected. The probability of F statistics is less than 5%. Hence, H₀ is rejected. As a result, at 95 percent level, model is accepted.

The model refined coefficient of determination equal to 0.2215. This statistic indicates that about 22 percent of dependent variable changes can be explained by independent variables. Since statisticsof model are not rejected, the hypotheses are evaluated.

Table 2. Results of model 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t- statistic</th>
<th>Level of Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.0055</td>
<td>-0.0948</td>
<td>0.9245</td>
</tr>
<tr>
<td>R&amp;D expenses</td>
<td>-1.0045</td>
<td>-2.5321</td>
<td>0.0118</td>
</tr>
<tr>
<td>High competition market</td>
<td>0.1111</td>
<td>-1.8310</td>
<td>0.0680</td>
</tr>
<tr>
<td>R&amp;D expenses</td>
<td>0.5957</td>
<td>1.2990</td>
<td>0.1948</td>
</tr>
<tr>
<td>Market value to book value</td>
<td>-0.0107</td>
<td>-1.7305</td>
<td>0.0845</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>Determination level</td>
<td>0.2331</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refined Determination level</td>
<td>0.2215</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td></td>
<td>2.3322</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td></td>
<td>2.8539</td>
<td></td>
</tr>
<tr>
<td>T-statistic</td>
<td></td>
<td>0.0238</td>
<td></td>
</tr>
</tbody>
</table>

The results of research model and t-statistic related to first hypothesis are shown in figure (2). The results of the table suggests, the probable error of the null hypothesis (no significant relationship between R & D spending and stock returns) is 0.0118, which is smaller than 0.05. Taking into account the t-statistics that is 2.5321 and when it is at 2 absolute value it should be greater than 2, therefore null hypothesis is rejected.

The results of research model and t-statistic related to second hypothesis are shown in figure (2). The results of table express that the probable error of the null hypothesis (no significant relationship between product market competition and stock returns) is 0.0680, which is smaller than 0.10 so hypothesis was tested based on the obtained estimates and on regression models. Obtained estimates and tests carried out showed that the coefficient used in in the regression model is significant. It represents the relationship between combined data of product market competition and stock returns in the financial statements of companies listed in Tehran Stock Exchange, therefore, null hypothesis is rejected. As a result, there is a significant relationship between product market competition and stock returns.

The results of research model and t-statistic related to third hypothesis are shown in figure (2). The results of table express that the probable error of the null hypothesis (there is significant relationship between R & D spending and stock returns in companies with high competition) is 0.1948, which is larger than 0.05. Since it shows that at 0.5957 level changes of this variable is effective on disclosure level, and considering that changes of companies with high competition and R&D expenses are effective on dependent variable and taking into account the t-statistic it can be concluded that null hypothesis is not rejected. Therefore, there is significant relationship between R & D spending and stock returns in companies with high competition.
5. Conclusion

First hypothesis: the results of the model showed that based on estimated coefficient for research and development expenditure and return on stock, there is a relationship between R & D expenditure and stock returns. With close evaluation of significant level of this variable, it can be seen that there is significant relationship between these two variables. Therefore, this hypothesis was confirmed.

Second hypothesis: the results of Second hypothesis of study showed that according to the estimated coefficient on this hypothesis for product market competition and returns on stock, there is a significant relationship between product market competition and stock returns. With close evaluation of significant level of this variable, it can be seen that there is significant relationship between these two variables. Therefore, this hypothesis was confirmed.

Third hypothesis: The third hypothesis test shows that based on estimated coefficient on this hypothesis for companies with high competition there is no significant relationship between R & D spending and returns on stock. However, With close evaluation of significant level of this variable, it can be seen that there is no significant relationship between these two variables. Therefore, this hypothesis was rejected.

<table>
<thead>
<tr>
<th>Hypnosis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is significant relationship between R &amp; D spending and returns on stock</td>
<td>$H_0$ is rejected</td>
</tr>
<tr>
<td>There is a significant relationship between product market competition and stock returns</td>
<td>$H_0$ is rejected</td>
</tr>
<tr>
<td>In companies with high competition there is significant relationship between R &amp; D spending and returns on stock</td>
<td>$H_0$ is not rejected</td>
</tr>
</tbody>
</table>
References

3. Adel Azar, Mansour Momeni, Said Jafari (2002), probability and statistics, the National Education Measurement and Evaluation Organization, Iran.