Analyze the impact of financial variables on the market risk of Tehran Stock Exchange companies

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Abstract
Given the importance of forecasts in investment decisions, and given that both risk and return on investment are important factors influencing the process, this study measures the financial impact on risk of companies listed on stock market. Thus in order to try to increase the knowledge of investors in the analysis, support or disapprove decisions or making new decisions efficiently. Financial variables studied in this research include ROI, gross profit margins and sales volumes. In order to test hypotheses concerning the relationship between Beta and financial variables, information about 106 companies of Tehran Stock Exchange from 84 to 88 years in the form of a regression model has been analyzed. The results suggest that there is a relationship between ROI and market risk, sales volume and market risk. Beta can be obtained and about 40 percent of the beta variation can be explained by the model.

Keywords: Tehran Stock Exchange, financial variables, systematic risk, ROI and gross profit margin

Introduction
Investment is necessary in the process of growth and economic development in counties. Some factors that affect in selecting investments, is the investor's risk and return on investment. Investors are trying to invest their financial resources to somewhere that the highest efficiency and lowest risk. Therefore, companies should focus not only on the benefit but also the risk must be considered as a limiting factor for maximum efficiency. Unlike return, risk is a mental conception and non-quantitative. Therefore, economic and financial experts' effort is more on to identify and measure risk. According to modern portfolio theory, risk is divided into two parts: systematic risk and non-systematic risk. On the other hand, the capital asset pricing model states that non-systematic risk can be eliminated through diversification, and can be overlooked, and only systematic risk should be considered in the decision making. But sometimes due to not enough data it is difficult for investors to calculate the risk. On the other hand, the accounting systems provide information's that is possible to access them easily and are highly reliable. Since accounting information reflects financial and operational decisions in the company, It is believed that with the use of accounting and financial information we can extract the company's systematic risk. And the financial and accounting information to be used as a
substitute for systematic risk (Belkaoui, 1978). Given that in the accounting literature quantifying risk is one of the benefits of accounting information from the view of investors (Namazi and Khajavi, 2004), experts and whom involved in capital markets, always on financial issues, have resorted numerous ways, such as market model, capital asset pricing model and the model Index to assess risk and all models have the main point is to rely on market prices. And this implicates the necessity of using stock companies in this study. Some studies have shown that accounting information is effective for changes in the stock market and corporate risk, it means that what the correlation between the, accounting and investment risk variables is more, prices of securities and The risk of the stocks in capital market reacts more quickly to new information And the market will move towards more efficient (Namazi and Zare, 2003). In this study, it is trying to use a method similar but with different variables, investigate the effect of financial variables such as ROI, Gross profit margin and sales volume on market risk for companies listed on stock exchange.

**Research background**

**Table 1 shows a Summary of Research Background**

<table>
<thead>
<tr>
<th>researcher</th>
<th>Year</th>
<th>Research variables</th>
<th>method</th>
<th>results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saad &amp; Zantout</td>
<td>2009</td>
<td>Share price, systematic risk and R &amp; D programs</td>
<td></td>
<td>Continuity of R &amp; D programs has no associated with systematic risk And stock prices of companies that consistently use R &amp; D programs is growing</td>
</tr>
<tr>
<td>Jula</td>
<td>2009</td>
<td>Systematic risk, financial leverage</td>
<td>Regression analysis</td>
<td>There was Positive relationship between total debt to equity ratio of systematic risk And the lack of relationship between long-term debt to equity ratio, Total debt to total assets, percentage change compared to the percentage change in operating profit and earnings per share compared to operational profit before tax with systematic risk</td>
</tr>
<tr>
<td>Li-Tzang &amp; Shawn</td>
<td>2008</td>
<td>Advertising costs, the value of company and stock returns risk</td>
<td>Tobin's Q and stock return variance</td>
<td>Advertising costs has a significant positive effect on company's intangible value and no Significant relationship between advertising costs and the risk of stock returns found.</td>
</tr>
<tr>
<td>Kim</td>
<td>2008</td>
<td>Advertising expenditures, research and development costs, risk and value of firm</td>
<td>Panel correlation</td>
<td>An Increase in advertising and research and development expenses leads to increase corporate value and Reduces the risk</td>
</tr>
<tr>
<td>Brimble &amp; Hodgson</td>
<td>2007</td>
<td>Accounting beta, earnings variability, growth, size, ratio of interest payments, current ratio, financial leverage, Interest</td>
<td>Correlation and regression analysis</td>
<td>More than 57 percent of the risk variation explained with the choice regression model</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>Variables</td>
<td>Method/Analysis</td>
<td>Findings/Comment</td>
</tr>
<tr>
<td>------------------</td>
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<td>---------------------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Brimble</td>
<td>2006</td>
<td>Accounting beta, changes in profits, growth, size, ratio of interest payments, current ratio, financial leverage, operating leverage and interest coverage ratio</td>
<td>Correlation and regression analysis</td>
<td>More than 57% of changes in systematic risk are explained by variables selected in the model.</td>
</tr>
<tr>
<td>Razmdide</td>
<td>2006</td>
<td>Financial leverage, systematic risk and return</td>
<td>Regression and correlation</td>
<td>There is no positive relationship Between financial leverage and systematic risk in the companies listed in Tehran Stock Exchange, but there is a positive relationship Between financial leverage and returns in companies listed in Tehran Stock Exchange.</td>
</tr>
<tr>
<td>Namazi and Khajavi</td>
<td>2006</td>
<td>Information entropy balance sheet items, profit and loss account, changes in stock prices and systematic risk</td>
<td>Combination of The data between group and time series</td>
<td>There is a significant relationship between information Entropy of balance sheet items and changes in stock prices, and there is a significant relationship between entropy balance sheet and profit and loss account systemic risk.</td>
</tr>
</tbody>
</table>

**The research hypotheses**

Considering that the aim of this study was to evaluate the impact of financial variables on market risk of firms in the stock market, therefore, research hypotheses are stated as follows:

Hypothesis1: The rate of return on investment influence on the market risk of Tehran Stock Exchange member firms.

Hypothesis2: The gross profit margin influence on the market risk of Tehran Stock Exchange member firms.

Hypothesis3: Sales volume influence on the market risk of Tehran Stock Exchange member firms.

**Research method**

**Population and sample**

The population study is all of the companies listed in Tehran Stock Exchange.

In this study the Remove systematic sampling method or targeted method was used, Therefore, companies that meet these conditions, they will be selected:

1 - no more than a year, depending on their icon.
2 – They are not included in financial and investment companies.
3 - Have more than three years experience in the stock market.
4 – They have Data from year 2005 to 2009.
5 - The fiscal year preceding the date 29 march.

Considering the above conditions, sample of 106 companies was selected.
Research model and variables
The present study investigated the effects of financial variables on the market risk. In order to increase the accuracy of the relationship between independent variables and the dependent variable, the overall regression model is developed below.

\[ \beta = \alpha_0 + \alpha_1 \text{ROI} + \alpha_2 \text{PM} + \alpha_3 \text{S} + \varepsilon \]

In this equation:
ROI: Rate of return on investment
PM: Gross profit margin
S: sales

The dependent variable
In this study Beta is the dependent variable, is known as an indicator of systematic risk (market) to estimating the companies systematic risk (B) Monthly stock returns and monthly market returns are used. with respect to the CAPM theory, Index of systematic risk (beta) is defined statistically as follow:

\[ \beta_i = \frac{\text{Cov}(R_{it}, R_{mt})}{\sigma^2(R_{mt})} \]

That:
Rit: is monthly return of stock in company i during the period (88-84).
Rmt: Monthly market portfolio returns during the period (88-84).
Market Portfolio returns by using the stock price index is calculated from the following formula:

\[ R_{mt} = \frac{I_{t2} - I_{t1}}{I_{t-1}} \]

In which:
It: Stock price index in the early periods
It-1: Stock price index at end of period

Independent variables
Independent variables include three variables that Information about them is derived and calculated from financial statements of companies by using annual data from years 88 to 84.

ROI
Investment rate of return calculates the profit per one Rial of investment company (Shapiro, 1995).

\[ \text{ROI} = \frac{\text{net profit after tax}}{\text{sum of assets}} \]

Gross profit margin
Gross profit margin = \frac{\text{The price of all goods sold} - \text{sells}}{\text{sells}}

Sales volume
A net sale equals gross sales minus sales returns and allowances that in profit and loss statement is presented.

Testing the research hypotheses
This study used sets of combined data. Before estimating the model, we should test stationary of variables by using Haudri test. But according to the number of years studied in this research is limited, There is no need to study the research variables stationary. In the panel data and combined method, when the number of sections is over the periods, there will be possibility for heteroscedasticity. If the method used is random effects, there is no need for resolving the problem of heteroscedasticity. Because this method acts as a process that heteroscedasticity problem is automatically solved. But when using methods of fixed effects or the combination of data, heteroscedasticity problem should be resolved. For this purpose generalized least squares (GLS) regression method used to estimate the model (saad and zantout,2009). To evaluate the presence or absence of heteroscedasticity LR test is used. The hypothesis H0 implies the consistency of variance and H1 is heteroscedasticity of component. So if the probability value obtained from this test is smaller than 0.05, then hypothesis of Consistency of variance is rejected and there is a heteroscedasticity problem. In order to determine the method of estimating the model for each of the models, Limer F test, Hausman test and heteroscedasticity tests has been conducted separately. The regression results obtained using the t statistic, F statistics and its probability, and R2 coefficients of the model were analyzed, and the research hypothesis were tested.

Table 2: Summary results of the estimation method for regression model F Limer

<table>
<thead>
<tr>
<th>Type of test</th>
<th>Statistics</th>
<th>the probability</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>F Limer</td>
<td>4.449819</td>
<td>0.000</td>
<td>Data panel method</td>
</tr>
</tbody>
</table>

Table 3: Summary results of Hasmn test between the fixed effects and random effects

<table>
<thead>
<tr>
<th>Type of test</th>
<th>Statistics</th>
<th>the probability</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hausman</td>
<td>31.925</td>
<td>0.0001</td>
<td>Fixed effects method</td>
</tr>
</tbody>
</table>

As mentioned previously, the following model has been used to test the research hypotheses:
\[ \beta = \beta_0 + \beta_1 \text{ROI} + \beta_2 \text{PM} + \beta_3 \text{S} + \varepsilon \]

Test the first hypothesis
The first hypothesis of this study is formulated as follows:
Rate of return on the investment influence on market risk in Companies listed on Stock Exchange. Summary results of the model using panel data - fixed effects is shown in Table (4-4)
Table 4: Summary results of the regression model using panel data methods - the fixed effects

\[ \beta = \beta_0 + \beta_1 \text{ROI} + \beta_2 \text{PM} + \beta_3 \text{S} + \epsilon \]

<table>
<thead>
<tr>
<th>variable</th>
<th>t statistics</th>
<th>Coefficient estimation</th>
<th>probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-9.32</td>
<td>-11.59</td>
<td>0.0000</td>
</tr>
<tr>
<td>ROI</td>
<td>-3.13</td>
<td>-0.403</td>
<td>0.0002</td>
</tr>
<tr>
<td>PM</td>
<td>-0.28</td>
<td>-0.047</td>
<td>0.7792</td>
</tr>
<tr>
<td>S</td>
<td>-2.96</td>
<td>-0.00273</td>
<td>0.0032</td>
</tr>
</tbody>
</table>

F : 7.440665  
\[ R^2 : 0.4095 \]

To investigate the effect of return on investment rate on stock market risk, T statistic on the amount of probable error of 0.05 is used. According to the results in Table 4, Coefficient for the investment rate of return is -0.403, indicating that Investment rate of return has a negative effect on stock market risk. The calculated value of t statistic for the coefficient of investment rate of return is greater than Critical value of t statistics in error 0.05 and likelihood for return on investment is 0.0002 that represents a significant coefficient obtained for the investment rate of return. So the first hypothesis will be accepted.

**The second hypothesis tests**

The second hypothesis of this study is formulated as follows:

Gross profit margins influence on stock market risk in Companies listed on Stock Exchange.

For investigating this hypothesis, t statistic on the amount of probable error of 0.05 is used. According to the results in Table 4, Coefficient for the investment rate of return is -0.047, indicating that Gross profit margins has a negative effect on stock market risk. The calculated value of t statistic for the coefficient of investment rate of return is smaller than Critical value of t statistics in error 0.05 and likelihood for return on investment is 0.77 that represents a lack of significant coefficient obtained for Gross profit margins. So the second hypothesis will be rejected.

**Third hypothesis**:

Sales volume influenced on stock market risk in Companies listed on Stock Exchange.

To investigate the effect of Sales volume influenced on stock market risk, t statistic on the amount of probable error of 0.05 is used. According to the results in Table 4, Coefficient for the investment rate of return is 0.00273, indicating that Sales volume influenced has a negative effect on stock market risk. The calculated value of t statistic for the coefficient of Sales volume influenced is greater than Critical value of t statistics in error 0.05 and likelihood for return on investment is 0.0032 that represents a significant coefficient obtained for the Sales volume influenced. So the third hypothesis will be accepted.
Conclusion

As mentioned, in this study we tested three hypotheses. The first hypothesis examines the effect of ROI on the market risk. Most researchers in their research concluded that there is a significant positive relationship between these two variables and in this study, the results of the regression model showed that in 95% confidence level there is a significant relationship between ROI and market risk, this relationship is negative.

The second hypothesis, this study examines the effect of gross margin of profit on market risk. Most studies that have examined the relationship between these two variables, have reached the significant positive relationship between these two. But in this study, statistical tests based on regression model indicate that there is no significant relationship between gross profit margin and market risk. The third hypothesis of this research is based on sales volume and market risk is accepted. Most studies that have examined the relationship between these two variables, have reached the significant negative relationship between these two variables. Also the results of the regression model showed that in 95% confidence level there is a significant relationship between sales volume and market risk, this relationship is negative.

According to the results, it seems that the market risk of the companies listed in Tehran Stock Exchange is a function of ROI and sales volume, indeed ROI, and sales volume, play an important role in market risk. But Gross profit margin does not influence the risk.

Implication for further research

1- In this research all systemic risk factors, have not been studied. There are other factors that may affect the systematic risk; therefore we suggest that these factors should be investigated in further researches.

2- As was mentioned, this study performed generally without differentiation between different industries. It is recommended that the research done to discriminate between different industries.

3- The period of this study is the years between 2005 -2009, therefore it is suggested that this research performed in different years.
References


