A STUDY OF THE RELATIONSHIP BETWEEN THE FINANCIAL AND NON-FINANCIAL VARIABLES, AND THE SYSTEMATIC RISK IN FIRMS LISTED IN TEHRAN STOCK EXCHANGE

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ABSTRACT

The present study investigates the relationship between the financial and non-financial variables, and the systematic risk in firms listed in the Iranian Capital Market (i.e. Tehran Stock Exchange). In line with this goal, a number of 63 companies whose required information for the 5-year period of the research (2006 through 2010, i.e. 1385 through 1389 in the Solar Calendar) was available, were selected. Then, the information related to the 5 variables (the dividend payout ratio, the operational leverage, the financial leverage, the firm size, and the growth opportunities), which are the independent variables of the study, were studied. The systematic risk, as the dependent variable of the research was calculated using the market model. Moreover, growth and liquidity were considered as the control variables. From the viewpoint of methodology and nature, this research is a correlation study. The statistical hypothesis testing was performed using the Pearson’s correlation coefficient, the coefficient of determination ($R^2$), analysis of variance (ANOVA), and linear regression analysis. The obtained results suggest that there is a significant relationship between the systematic risk, and the 4 variables (the dividend payout ratio, the operational leverage, the firm size, and the growth opportunities), and there is no a significant relationship between the systematic risk and the financial leverage.

KEYWORDS: Stock Exchange, Systematic Risk, Dividend Payout Ratio, Operational Leverage, Financial Leverage, Firm Size, Growth Opportunities

Investment is one of the essential and fundamental factors in the process of economic growth and development of every country. Investors try their best to place their funds where there is the highest level of efficiency and the lowest level of risk. In this regard, they naturally pay special attention to investment risk. The balance between the risk and expected returns is taken into consideration by the investors as one of the sources of corporate financing, in such a way that they attempt to spend their resources and invest in projects which are likely to have the highest returns. Risk and Return on investment (ROI) are two key factors in various types of investments: The returns earned by an investor are uncertain, therefore, they have to bear a risk. On the other hand, in a rational investment, the non-systematic risk can be eliminated or reduced by diversified investments in various industries. Indeed, the amount of risks and returns one should be noted in any type of investment (Nikoumaram et al, 2002). One of the influencing factors in “selecting” and “conducting” investments, is the investors’ consideration of the risks and returns associated with the investment. The role of risk and return in the investment market is identical to the role of supply and demand in the economy, for commodity pricing. One important dilemma recently investigated by the scholars, is the relationship between the financial statements and risk. The backbone of these studies is the evidence suggesting that finding the extent and adjusting this relationship is helpful in the usefulness of accounting information in making investment decisions and developing portfolios.

Today, the studies of risk and return and its impact on financial and managerial decisions, are among the issues that are highly regarded by the decision-makers, managers, and investors. All stakeholders of an economic unit seek to find ways to increase the value of their shares or assets in today’s changing environment, which is influenced by various risks. Extensive research in the area of financial management and investment in the recent century reflects the importance of this issue.

PROBLEM STATEMENT

From an economic point of view, it is often assumed that the individuals, including the participants in the capital market, try to achieve the highest level of welfare and maximize their benefits. Therefore, it would be rational that the mentioned investors seek to find investment opportunities with the maximum level of return and minimum level of risk. Consequently, the investors will need a tool by which they can predict the
return and risk associated with any investment, and make prudent decisions. One of the most common theoretical models used for the prediction of stock returns is the capital asset pricing model. Before implementing this model in the decision-making process, first, it is necessary to determine the main variable of the model, i.e. the systematic risk. Accordingly, in this regard, the investors will pay special attention to the process of predicting the systematic risk.

There are several factors and accounting variables for risk assessment, which contain helpful and valuable information for this purpose. However, one should scrutinize to what extent these measurable financial and non-financial are capable of assessing the risk, specially the systematic risk which is relatively effective in all companies. The reason for this is that the accounting variables and the measures of systematic risk are utilized as a substitute for predicting and estimating the returns in developing the accounting policies based on market prices. The purpose of this study is to determine the BETA coefficient (financial fundamental index) and to evaluate the capability of the independent variables to change or reduce over time. So according to the above lines, the following fundamental questions arise:

1. Is there any significant relationship between the financial variables and systematic risk in the Iranian Capital Market?
2. Is there any significant relationship between the non-financial variables and systematic risk in the Iranian Capital Market?
3. Is there any significant relationship between the financial and non-financial variables and systematic risk in the Iranian Capital Market?

BACKGROUND RESEARCH

Many studies focusing on capital market-based accounting, have confirmed the usefulness of accounting information in determining the securities risk, including Beaver (2002), Kothari (2001), Brown (2002), Lee (2001), and Almashir (2000). Also, numerous researches have studied the correlation between the accounting variables (financial leverage, operational leverage, etc.) and the systematic risk of securities (Namazi and Khajavi, 2004, 96).

The initial studies of the risk-related accounting information date back to 70s, and the studies conducted by Beaver et al (1970) in the United States, and Castegna and Matolscey (1978) in Australia. One simple method for estimating the company’s systematic risk is to implement the capital asset pricing model (Sharpe, 1964; Lintner, 1965), through which the temporal stability or the average changes in the value of beta coefficient is calculated. Subsequently, a number of accounting scholars have attempted to identify accounting variables that are related to risk measures of beta. One category of studies conducted by these scholars, focus on the speculative theories which assume that the accounting variables play a role in determining the systematic risk (Rean, 1997; Laveren et al, 1997). Beaver, Kettler, and Scholes (1970) have tested seven variables concerning the relationship between the accounting variables and risk, including: dividend payout ratio, asset growth, financial leverage, asset size, current ratio, earnings variance, and accounting beta. They have gathered evidence, suggesting that the use of accounting variables is helpful in forecasting the systematic risk, and also the obtained model presents a more precise index for predicting the risk, compared to the beta coefficient. Their final model encompassed only 3 out of the 7 mentioned variables: the dividend payout ratio (negatively related), the growth of asset index (positively related), and the earnings variance (positively related), that explained about 45% of the changes in market-beta. Interestingly, the accounting beta (which is defined as the covariance of the company’s accounting profits and marketing profits, and is almost identical to market-beta) was eliminated from the model.

Eskew (1979) conducted a study, testing the capability of the accounting measures of risk in forecasting the beta. The model he obtained provided better results, in comparison to the market model. Although the performance difference between the two models was slight, Eskew suggested that the beta obtained from the model based on the accounting variables, is the most satisfying model for predicting the risk, since the accurate and timely estimation of market-beta is very difficult.

In his study, Brimble investigated the role of accounting information in the estimation of systematic risk. The accounting variables studied in this research included the accounting beta, the earnings variance, growth, and size, the dividend payout ratio, the current ratio, the interest coverage ratio, and the operational leverage. Moreover, the mentioned study used the information collected from 123 companies during the period 1991 through 2000. The findings of the study
suggested that the above mentioned accounting variables can explain over 57 percent of the changes in the systematic risk (Brimble, 2003, 526).

Abdelghany (2005) in his study entitled “Disclosure of market risk or accounting measures of risk” examined the relationship between the systematic risk and the accounting measures of risk. These measures included the leverage ratio, the asset size, the current ratio, the earnings variance, the earnings growth, the dividend payout ratio, and the earnings beta. The findings of the study indicated that the four measures of the asset size, the current ratio, the earnings growth, and the dividend payout ratio are significantly related to the systematic risk, whereas the relationship between the other variables and the systematic risk are statistically insignificant.

Hassan GhalibafAsl (1994) studied the relationship between the effectiveness of the capital structure (the financial leverage) and the systematic risk of the normal shares of the companies listed in Tehran Stock Exchange in 26 companies and during the period 1989 through 1993 (1368 through 1372 in the Solar Calendar). The results of this study showed that the financial leverage is directly related to the systematic risk.

Ahmadpour and Namazi (1998) investigated the impacts of the operational leverage, the financial leverage, and the firm size on the systematic risk of the normal shares of the companies listed in Tehran Stock Exchange during the 5-year period 1991 through 1994 (1370 through 1374 in the Solar Calendar). Using the regression analysis and statistical techniques, they inferred that the financial leverage is effective on the amount of the systematic risk, meaning that an increase in a company’s debts is associated with an increase in the systematic risk as well; however, the operational leverage is not effective on the systematic risk. Also, they found that the firm size has a significant inverse effect on the systematic risk.

Namazi and Khajavi (2004) have examined the usefulness of accounting variables in forecasting the systematic risk of the companies listed in Tehran Stock Exchange in 40 companies and during the period 1991 through 2001 (1370 through 1380 in the Solar Calendar). In this research, they have used 17 independent accounting variables, and implemented the statistical techniques, simple regression, and multivariate regression for testing of the hypotheses. Their findings indicated that there is a significant relationship between 12 out the 17 variables of the research and the systematic risk.

Khademi (2009), in his study, investigated the relationship between the investment opportunities and the growth of assets in the companies listed in Tehran Stock Exchange, and achieved the following results:

1. There is a positive correlation between the market-to-book ratio of equity, and the growth of assets.
2. There is a positive correlation between the market-to-book ratio of the normal shares and the growth of assets.
3. There is no positive correlation between ratio of price per share to earnings per share (P/E) and the growth of assets.

RESEARCH HYPOTHESES

1st main hypothesis: There is a significant relationship between the financial variables and the systematic risk in the Iranian Capital Market.

There is a significant relationship between the dividend payout ratio and the systematic risk in the Iranian Capital Market.

There is a significant relationship between the operational leverage and the systematic risk in the Iranian Capital Market.

2nd main hypothesis: There is a significant relationship between the non-financial variables and the systematic risk in the Iranian Capital Market.

There is a significant relationship between the financial leverage and the systematic risk in the Iranian Capital Market.

There is a significant relationship between the financial leverage and the systematic risk in the Iranian Capital Market.

3rd main hypothesis: There is a significant relationship between the financial and non-financial variables and the systematic risk in the Iranian Capital Market.

RESEARCH METHODOLOGY

The present study is an applied research (in terms of objective) and a correlation-based study (in terms of nature). Correlation studies include all research
projects in which the aim is to determine the relationship between various variables by the use of the correlation coefficient.

The statistical population of the study includes all of the companies listed in Tehran Stock Exchange, which have been active during the 5-year period 2006 through 2010 (1385 through 1389 in the Solar calendar). Moreover, the selection of the study sample among the companies listed in Tehran Stock Exchange was performed regarding the following prerequisites:

1. The company must have been active in the Stock Exchange during the period 2006 through 2010.
2. The company’s fiscal year must terminate in March (the end of the Solar Calendar).
3. The company must not be in the category of financial intermediaries.
4. The company must have not trading halt for more than 6 months.

According to the mentioned conditions, 63 companies were selected as the final sample of the study. The data and information required for the research were gathered from the official websites of Tehran Securities and Exchange Organization, such as the website of Research, Development, and Islamic Studies (at www.rdis.ir), the Informatics Center of Stock Exchange, and the Rahavard-e-Novin software pack; and the required initial calculations were carried out in Excel spreadsheets. Then, the final analyzes were performed using the SPSS software. The following multivariate regression equation was implemented in order to test the research hypotheses.

$$\beta_i = \alpha + \beta_i R_{it} + \epsilon_i$$

(Eq. 1)

Where:
- DPR$_{it}$: Dividend Payout Ratio
- Size$_{it}$: Firm Size
- Oplev$_{it}$: Operational Leverage
- Growop$_{it}$: Growth Opportunities
- Flev$_{it}$: Financial Leverage
- Growth$_{it}$: The Firm Growth
- Liq$_{it}$: Liquidity
- $\alpha$: The Intercept Term
- $\epsilon_i$: The Error Term

For the purpose of the research, the systematic risk of firms using the market model is first calculated as follows:

$$R_{it} = \alpha + \beta_i R_{mt} + \epsilon_{it}$$

(Eq. 2)

Where:
- $R_{it}$: The returns of the company $i$ during the period $t{-1}$ to $t$
- $\beta_i$: The systematic risk of the company $i$ during the studied period
- $R_{mt}$: The market returns (average returns of all shares on the market)
- $\epsilon_{it}$: The Error Term

The Method of Measuring the Variables

$\beta_i$ (The systematic risk) represents the dependent variable of the study, and is calculated as follows:

$$\beta = \frac{COV(R_i, R_m)}{VAR(R_m)}$$

(Eq. 3)

The dividend payout ratio, the operational leverage, the financial leverage, the firm size, and the growth opportunities, are the independent variables of the research, and are occasionally used for the testing of the study hypotheses. These variables are calculated as follows:

**Dividend Payout Ratio**

The dividend payout ratio is calculated by dividing a firm’s dividend per share by its earnings per normal share:

$$\text{Dividend Payout Ratio} = \frac{\text{Dividend Payment per Share}}{\text{Earnings per Share}}$$

(Eq. 4)

**Degree of Operational Leverage**

The degree of operational leverage is a quantitative measure for evaluating the firm’s operational leverage, and is calculated as follows:

$$\text{DOL} = \frac{\frac{Q(P-V_C)}{Q(P-V_C)-(P-C)}}{\frac{\Delta \text{EBIT}}{\Delta S/S}}$$

(Eq. 5)

Degree of Financial Leverage:
The degree of financial leverage is a quantitative measure for evaluating the firm’s financial leverage, and is calculated as follows:

\[
DOL = \frac{\frac{Q(P-VC)}{Q(P-VC)-(P-C)-I}}{\frac{EBIT}{EBIT-I}} \quad (Eq. 6)
\]

Firm Size

There are various measures for assessing the firm size, among which the most famous is the logarithm of either assets or sales. This study uses the logarithm of sales for calculating the firm size, as follows:

\[
Size_{it} = \log_{10}(Sales) \quad (Eq. 7)
\]

Growth Opportunities

The present study uses the following index to assess the growth opportunities:

\[
MBASSET = \frac{Market\ Value\ of\ Assets}{Book\ Value\ of\ Assets} \quad (Eq. 8)
\]

Control Variables

Firm Growth

The percentage change in the total assets of the company I at the end of the fiscal year t, in relation to the fiscal year t-1:

\[
Growth = \left(\frac{Total\ Assets\ of\ the\ Current\ Year - Total\ Assets\ of\ the\ Previous\ Year}{Total\ Assets\ of\ the\ Previous\ Year}\right) \times 100 \quad (Eq. 9)
\]

Equity

In this study, the current ratios are used to calculate the equity, as follows:

\[
Equity = \frac{Current\ Assets}{Current\ Debts} \quad (Eq. 10)
\]

DATA ANALYSIS

The following table illustrates a summary of hypothesis testing:

<table>
<thead>
<tr>
<th>Research Variables</th>
<th>Statistical Components</th>
<th>Correlation Coefficient</th>
<th>Coefficient of Determination ( (R^2) )</th>
<th>Adjusted ( R^2 )</th>
<th>Durbin-Watson</th>
<th>( t )-Statistic</th>
<th>( F )-Statistic</th>
<th>Significance level</th>
<th>Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>The relationship between the financial variables (the dividend payout ratio, the operational leverage, and the financial leverage) and the systematic risk</td>
<td>0.196</td>
<td>0.038</td>
<td>0.023</td>
<td>1.845</td>
<td>-1.569</td>
<td>1.769</td>
<td>0.470</td>
<td>2.473</td>
<td>0.098</td>
</tr>
<tr>
<td>The relationship between the dividend payout ratio and the systematic risk</td>
<td>0.167</td>
<td>0.028</td>
<td>0.018</td>
<td>1.821</td>
<td>-1.717</td>
<td>2.965</td>
<td>0.087</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>The relationship between the operational leverage and the systematic risk</td>
<td>0.171</td>
<td>0.029</td>
<td>0.020</td>
<td>1.825</td>
<td>1.853</td>
<td>3.129</td>
<td>0.065</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>The relationship between the financial leverage and the systematic risk</td>
<td>0.143</td>
<td>0.021</td>
<td>0.011</td>
<td>1.817</td>
<td>0.781</td>
<td>2.170</td>
<td>0.436</td>
<td>Rejected</td>
<td></td>
</tr>
<tr>
<td>The relationship between the non-financial variables (the firm size, and the growth opportunities) and the systematic risk</td>
<td>0.241</td>
<td>0.058</td>
<td>0.046</td>
<td>1.763</td>
<td>1.671</td>
<td>4.798</td>
<td>0.096</td>
<td>0.002</td>
<td>Confirmed</td>
</tr>
<tr>
<td>The relationship between the firm size and the systematic risk</td>
<td>0.165</td>
<td>0.027</td>
<td>0.018</td>
<td>1.802</td>
<td>1.665</td>
<td>2.904</td>
<td>0.097</td>
<td>Confirmed</td>
<td></td>
</tr>
<tr>
<td>The relationship between the growth opportunities and the systematic risk</td>
<td>0.223</td>
<td>0.050</td>
<td>0.041</td>
<td>1.767</td>
<td>3.197</td>
<td>5.435</td>
<td>0.002</td>
<td>Confirmed</td>
<td></td>
</tr>
</tbody>
</table>
First main hypothesis: The relationship between the financial variables and the systematic risk measure is studied.

The results of the performed test are shown in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is in accordance with the findings of Lou (1974), Hill & Stone (1980), Brimble (2003), Abdelghany (2005), and Namazi & Khajavi (2004).

First secondary hypothesis: The relationship between the dividend payout ratio and the systematic risk measure is studied.

The results of the performed test are shown in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is aligned with the findings of Kahrizi (2010) and Abdelghany (2005).

Second secondary hypothesis: The relationship between the operational leverage and the systematic risk measure is studied.

The results of the performed test are shown in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is in accordance with the findings of Lou (1974), and Kahrizi (2010).

Third secondary hypothesis: The relationship between the financial leverage and the systematic risk measure is studied.

The results of the performed test are indicated in table (1). The information displayed in the table does not confirm the significant relationship between the two variables. The obtained result is in agreement with the findings of Eskew (1979), and Kahrizi (2010).

Second main hypothesis: The relationship between the non-financial variables and the systematic risk measure is studied.

The results of the performed test are shown in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is in line with the findings of Ahmadpour and Namazi (1998), and Zahed Aghaei (2009).

Fourth secondary hypothesis: The relationship between the firm size and the systematic risk measure is studied.

The results of the performed test are illustrated in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is in agreement with the findings of Ahmadpour and Namazi (1998).

Fifth secondary hypothesis: The relationship between the growth opportunities and the systematic risk measure is studied.

The results of the performed test are illustrated in table (1). The information displayed in the table confirms the significant relationship between the two variables. Since to studies have been conducted in this area, the authors refer to a similar study that has implemented the same ratio used in this study. The obtained result is in line with the findings of the study conducted by Zahed Aghaei (2009).

Third main hypothesis: The relationship between the financial and non-financial variables and the systematic risk measure is studied.

The results of the performed test are illustrated in table (1). The information displayed in the table confirms the significant relationship between the two variables. The obtained result is in agreement with the findings of Beaver et al (1970), and Castegna and Matolscy (1978), and Almashir (2000), Lee (2001), Beaver (2002), Brimble (2003), Ghalibaf Asl (1994), Ahmadpour and Namazi (1998), and Namazi and Khajavi (2004).
CONCLUSION

After testing each hypothesis separately, it is now turn for the general conclusion. Conduction the present study, the researchers sought to find the answer to the question of whether the changes in the financial and non-financial variables lead to a change in the firms’ systematic risk – which is highly regarded by the investors and shareholders. The confirmation of the hypotheses related to the financial and non-financial variables (dividend payout ratio, operational leverage, firm size, and growth opportunities) and the systematic risk, and also the first, second, and third main hypotheses, suggests that the changes in the accounting variables are consistent and aligned. In other words, when the accounting variables of the firms increase (decrease), the systematic risk of the firms will increase (decrease) as well. The significant relationship between these variables indicates that the studied variables can be considered and used as a source of information in order to forecast the firms’ systematic risk.

Moreover, the rejection of the third secondary hypothesis means that the coefficient of the financial leverage variables is not significant; and it does not encompass sufficient evidence to account for the systematic risk. Therefore, the existence of a significant relationship between the beta-risk and the mentioned variable is not confirmed.

RECOMMENDATIONS BASED ON THE RESEARCH FINDINGS

According to the testing of the hypothesis and the results obtained from this study, the following recommendations are presented:

1. The investors are suggested to rely less on the traditional measures (such as the operational leverage and financial leverage) for assessing the systematic risk of the companies, and seek to find more appropriate models in this regard.
2. Considering the importance and the key role of risk in the valuation of shares, the practitioners and policy makers have to provide conditions under which it would be possible to have a better estimation of the firms’ risk, using the effective data.
3. According to the probability of a relationship between the systematic risk and the variables of the research, based on the comparison between this relationship and the findings of the research, it can probably be said that the fair presentation of the information can be one of the factors affecting the study results. Therefore, it would be worthwhile that the professional individuals and communities take more effective steps towards developing financial reporting standards.

SUGGESTIONS FOR FUTURE RESEARCH

1. Future researchers are suggested to use a more diverse range of variables in order to test their potential relationship with systemic risk.
2. If possible, the future researchers are recommended to investigate the relationship between the accounting variables and the systematic risk in the industry level; because analysis in the level of a specific industry provides the investors with more useful information.
3. If possible, study of the relationship between the macroeconomic variables such as the inflation risk and the systematic risk can improve the beta estimation process.
4. Examining the relationship between the variables related to the management decisions and the systematic risk can probably enhance the explanatory power of the model. Thus it is suggested that the future studies take them into account.
5. The researchers are recommended to use the beta adjustment techniques in order to assess the systematic risk, and compare their results to the findings of the present study. According to Sharpe’s point of view, the investment risk can be divided into two categories of systematic and non-systematic risks. The approach of the present study was to examine the relationship between the accounting variables and the systematic risk. The future researchers can study the relationship between these variables and either the total risk of an investment, or the other part of the investment risk, i.e. the non-systematic risk.

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