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Determinants of Systematic Risk of the Listed Companies in Tehran Stock Exchange

Kheder Alaghi

PhD student at Armenian State Agrarian University, Faculty of Economics, Department of Accounting
Postal address: 29 apt., Komitas str. 7, Yerevan, Armenia

ABSTRACT

The ultimate goal of companies' financial management is to increase market value of shareholders' equity. Systematic risk is one of the key factors to be considered by financial managers to make right decisions for company owners. Therefore, it is urgent for the financial managers of a company to understand the factors that may influence systematic risk. It will enable them to control it and avoid the possible breakdowns in shareholders' value. Considering the significance of systematic risk in financial management, the goal of the current paper is to find the factors that can determine systematic risk. To achieve the goal of the paper first, 457 non-financial companies have been selected from Tehran Stock Exchange. Second the financial determinants have been selected and measured. Third, the corresponding hypothesis has been developed. Finally, they have been tested by means of common affect model. The findings proved to be rather convincing.
KEYWORDS: Risk, Model, Determinants, Shareholder, Value.

INTRODUCTION

Toincrease the capabilities, competitiveness, quality of technology, operational methods and investments on development projects organizations need financial support. Capital market plays significant role in economic system supplying the provision of financial support to different sectors. The stock market, particularly, serves as a tool for turning the inefficient public or even private corporations into corporations with high productivity [1]. Systematic risk is one of the most important factors related to stock market worth to be considered in investment and financial decisions. Making decisions about financing is basically of great importance for two groups. The first group consists of the managers or directors of the companies. An access to low-cost, low-risk and long-term capital resources is a crucial aspect for the companies, because any funding involves some charges which should be paid by the company through the returns on its investment, and the non-payment of such funds will result in serious problems. The second group includes the financiers and/or the stockholders. Since this group is seeking more profits and lower risks, this aspect is a matter of great importance to them. They want financial decisions to be made in a way to reach an increase in the company's profitability and value [15].

Systematic risk of a company is vital because it indicates the risk of the company in relation to the market risk and if it is higher than the market risk, it affects shareholders' value as risk changes immediately are reflected in stock prices in efficient markets. Risk can decrease or increase stock prices thus increasing or decreasing the value of the shareholders. Today the economic activities are related with various risks. Changes in different factors such as price levels, economic laws and factors affecting market supply and demand are among the main reasons for uncertainty in economic activities. The development of economic activities and increase in bankruptcy of different financial institutions, increase the importance of the risk management by means of appropriate instruments for measurement and control of market risk[6].Therefore, to understand the determinants of systematic risk is vital for companies' financial managers to be able to increase shareholders value, keep company away from bankruptcy and attract investors. Following this, the goal of the current study is to explore the financial determinants of systematic risk. To achieve the goal 457 non-financial companies have been selected from the Tehran Stock Exchange. Based on the collected financial information the dependent and independent variables have been determined. Then, the hypotheses have been formulated and tested by the corresponding statistical tools. The results indicate that there are four variables that can determine systematic risk.

LITERATURE REVIEW

According to the Sharp (1963) there are two types of risks associated with all companies: systematic and unsystematic. Systematic risk affects a large number of assets and because systematic risks have market-wide effects, they are sometimes called market risks. An unsystematic risk is one that affects a single asset or a small group of assets. Since this risk is unique to individual companies or assets, it is also called unique or asset-specific risks. Systematic risk measures amount of risk present in a particular risky asset relative to that in an average risky asset. Unlike unsystematic

***Corresponding Author:** Kheder Alaghi, PhD student at Armenian State Agrarian University, Faculty of Economics, Department of Accounting Postal address: 29 apt., Komitas str. 7, Yerevan, Armenia

risk that can be removed or decreased with the help of diversification, systematic risk is non-diversifiable. The expected return on an asset depends only on that asset's systematic risk. The model that describes the relationship between systematic risk and expected return is CAPM (Capital asset pricing model). Mathematical representation of CAPM is as follows:

Formula 1

$$E(Ri) = R_{fr} + ß_i \, (E(R_m) - R_{fr})$$

The CAPM indicates that the expected return for a particular asset depends on three things:

1. The time value of money, as measured by the risk free rate (R_{fr}), this is the reward for waiting for return without bearing any risk.
2. The reward for bearing systematic risk, as measured by the market risk premium ($E(R_m) - R_{fr}$), this is the reward that the market offers for bearing average amount of systematic risk in addition to waiting.
3. The amount of systematic risk, as measured by $ß_i$ which is the amount present in a particular asset relative to an average market asset [16].

Beta is measured according to the relationship between the market return and expected return on a security [9] and mathematically it can bepresented as follows:

Formula 2

$$E(R_i) = ß_0 + ß_i R_m + e_i$$

$E(R_i)$ indicates expected return of a company that is expressed as alinear function of market return R_m and errors e_i. Based on this formula beta can be derived in the following way:

Formula 3

$$ßi = \text{Cov}(E(Ri), Rm) / \text{Var}(Rm)$$

The formula indicates direct relationship between risk, expected return and market return. Hence, systematic risk is the key factor for the investors to determine the expected return. The higher is the systematic risk, the higher is the expected return on the investment. Therefore, the ability to control systematic risk is very important not only for current shareholders but also for attracting potential shareholders. The fact that systematic risk is essential for making financial decisions has been proved by many researches. There has been great number of researches that have aimed to identify the determinants of systematic risk. Most of them have focused on financial determinants of systematic risk [8, 9].

Some researchers have indicated that there is a negative relationship between profitability and systematic risk in some industries and positivein others[8].

Borde et al. (1994) have found out positive relationship between profitability and systematic risk in insurance companies[2].The underlying idea is that in financialinstitutions more profit leads towards greater risk.

According to Logue and Merville (1972) profitability, debt ratio and company size play significant role in determining systematic risk [10].

Damodaram (2009) suggests that the degree of financial leverage, operating leverage and company size are among the key factors which affect the beta values of companies [3].

Jensen (1984) has estimated a positive relationship between systematic risk and liquidity [5]. However, most studies have found out a negative relationship between systematic risk and liquidity [5, 8, 9, 10, and 13]. The argument here is that systematic risk decreases whenliquidity of a firm increases.

Then, according to Milicher (1974) there is a positive nonlinear relationship between leverage and systematic risk.

Olib et al., (2008) have used leverage in their study as independent variable and found positive relationship between leverage and systematic risk [14].The underlying idea is that large firms should have lower systematic risk due to economies of scale.

Slliven (1978) argues that there is a low systematic risk in large companies because the large firms are able to control the impact of economic changes more efficiently.

According toTitman andWessels (1998) large enterprises have more opportunities for diversification and due to which they decrease systematic risk [17].

Further, researchers also show that operating efficiency has negative impact on risk [5, 8].

Some researchershave applied time series data to estimate future beta values based on past periods, i.e. time has been identified as a determinant [11, 12].

There have been researchesfocusing on the impact of macroeconomic factors on systematic risk. Patro et al (2000) have found out that several variables including inflation, imports, exports significantly affect systematic risk [4].

METHODOLOGY

The sample of the current study includes 457 listed companies in Tehran Stock Exchange (http://www.tse.ir/). The data covers 2001-2011. The statistical package used is SPSS 16 and statistical tools used are Common Effect Model and descriptive statistics. Under the common-affect model the observed explanatory variables are treated as non-random variables. In panel data analysis, the common effect estimator is used as a coefficient in the regression model. If we assume common effect, we apply time independent effects for each entity that are likely to be correlated with the independent variables.

Panel data applied in the current research has combined the time series and cross sectional data. To test the hypotheses the following Common Effect Model has been used:

Formula 4

$$\beta_{it} = \alpha_0 + \alpha\ LQ_{it} + \alpha\ LV_{it} + \alpha\ OE_{it} + \alpha\ PF_{it} + \alpha\ FS_{it}$$

Dependent variable, systematic risk for each firm has been estimated by linear regression model for 10 years in the following way:

Formula 5

$$\mathbf{R_c = \beta_0 + \beta_1 R_m} \quad \Rightarrow \quad \mathbf{\beta_1 = R_c - \beta_0 / R_m}$$

Where R_c is monthly average returns of a company; R_m is monthly average returns of market; coefficient β_1 is estimated systematic risk on yearly bases.

The selection of the determinants (independent variables) for the current study is based on the fact that they can help managers to assess systematic risk and control it by means of firm specific factors. Independent variables and the corresponding measurements are presented in the table below.

Table 1- Independent Variables

Independent Variables	Measurement
Liquidity (LQ)	Quick Ratio = Current asset – Inventory / Current liability
Leverage(LV)	Debt ratio = Total Debt / Total Assets
Operating Efficiency (OE)	Asset Turnover = Total revenue / Total Asset
Profitability(PF)	Return on Assets = Net income / Total Assets
Firm Size(FS)	LOG(Total Asset)

Liquidity indicates the firm's ability to convert an asset to cash quickly.
Leverage refers to the amount of debt used to finance a firm's assets. The higher is the debt the higher is the leverage.
Operating efficiency measures a firm's ability to generate sales with the given investment in total assets.
Profitability, which is calculated by measuring return on assets, indicates how profitable a company is relative to its total assets, i.e. how efficiently management uses its assets to generate earnings.

To understand which of the selected determinants are important for reducing systematic risk the following hypotheses have been put forward and tested:
H_1: Liquidity is negatively related to systematic risk.
H_2: Leverage is positively related to systematic risk.
H_3: Operating efficiency is negatively related to systematic risk.
H_4: Profitability is positively related to systematic risk.
H_5: Firm size is negatively related with systematic risk.

RESULTS AND DISCUSSIONS

Table 2 demonstrates the descriptive statistics of systematic risk (beta) and five independent variables for 457 listed companies for ten year period of 2001- 2011. Mean value of beta is 0.825. This means that the systematic risk on average of the selected companies is less than market risk that is always equal to 1, which implies that the listed companies are less risky than market. Liquidity has average score of 1.072 with std. deviation of ±0.856 which indicates the listed companies on average have enough cash and receivables to cover their current liabilities. Leverage has mean of 0.721 with deviation of ±0.374 indicating that on average 72.1% of the assets are financed by debt. Operating efficiency indicates that the average return on capital invested in the total assets is 16.3%from sales revenue. Finally, profitability

measures indicate that average rate of return on investment is 8.1%.

Table 2-Descriptive Statistics

	Beta	LQ	LV	OE	PF	FS
Mean	**0.825**	**1.072**	**0.721**	**1.163**	**0.081**	**8.02**
SD	**0.674**	**0.856**	**0.374**	**0.642**	**0.346**	**1.02**
N	**457**	**457**	**457**	**457**	**457**	**457**

Table 3 indicates the relationship between the selected financial variables and systematic risk. Common Effect Model is significant at the level of 5 percent with all variables significant with the exception of size. As the results indicate, size does not have significant impact on risk. According to first hypothesis of the study, liquidity is negatively related to beta. The results support the hypothesis indicating that one unit increase of liquidity will decrease systematic risk by 0.4581 units and vice versa. Second hypothesis states that there is a positive relationship between leverage and risk. The results support the second hypothesis as well by pointing out that with 95% confidence leverage increases systematic risk. To avoid systematic risk increase managers should control their firm financing by means of debt. As to third hypothesis, it is also supported by the results, i.e. Increase of operating efficiency will decrease risk and vice versa. Finally, the fourth hypothesis also is accepted, concluding that the higher is the profitability, the higher is the risk. The R-square coefficient is not very high which indicates that there are other factors apart from the five factors studied here that can influence systematic risk. Still, it shows that 58% of the variability in systematic risk is explained by the variability of the four significant financial factors.

Table 3-Results of the Common Effect Model

	Coefficients	Standard Error	t-value
Intercept(constant)	**0.8420**	**0.6520**	**1.24**
LQ	**-0.4581**	**0.0426**	**-7.86***
LV	**0.5620**	**0.1405**	**2.40***
OE	**-0.3248**	**0.0286**	**-4.58***
PF	**1.8622**	**0.2324**	**6.28***
FS	**-0.5460**	**0.1458**	**-0.58**
R^2	**0.58**	**Adjusted R Square**	**0.565**
F Statistics	**2.186***	**Observations**	**457**

***Significant at the level of 5%.**

Conclusion

The findings of the current research support previous researches. Financial variables do play significant role in determining systematic risk. The main goal of a company is to increase shareholders' value. To understand the factors related to systematic risk is very useful for investors and company managers. Though the higher risk promises higher returns, it also promises high losses. To avoid such losses managers should consider these factors not to put the shareholders' value at high risk. Investors should consider them to be able to assess the risk of investment according to the degree of their risk tolerance. Current study has analyzed the relationship between systematic risk and financial variables. Four financial variables are found to be the determinants of systematic risk. Managers can estimate these factors to control systematic risk and to improve financial performance of a firm.

The limitation of the current research is perhaps the fact that the study included only non-financial companies. The consideration of financial companies is suggested for future researches. Another limitation is connected with the number of determinants. As it was discussed above, the current determinants explain only 58% of variations in systematic risk, which means that there can be other factors which affect systematic risk. We suggest for future researches to find other than the current determinants of systematic risk.

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