THE IMPACT OF THE SYSTEMATIC RISK AND THE FINANCIAL LEVERAGE ON THE PORTFOLIO RETURNS IN TEHRAN STOCK MARKET

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ABSTRACT
Regarding the fact that burse is considered as one of the indicators of economic growth, and since many people invest their assets and savings there, a series of questions for investment may raise in the mind of investors. Therefore this paper is in search of a response to this question, whether or not there is a significant relationship between the systematic risk and financial leverage with portfolio returns? To find the answer the following theories will be used.
1. There is a significant relationship between the portfolio return and the systematic risk of stock.
2. There is a significant relationship between the portfolio return, financial leverage and systematic risk.
In this paper, the data was taken out of 21 companies operating in the automotive, petrochemical, plaster and cement industries from 2005 to 2013 by Dena data bank, and the Pearson's correlation method was used for testing the hypotheses. In this paper, we came to the conclusion that there is a significant relationship between the systematic risk and portfolio return at the error level of \( \alpha = 5\% \), and also there is a significant relationship between the portfolio return and the financial leverage and the systematic risk at the error level of \( \alpha = 10\% \).

Keywords: Revenue, Portfolio Return, Financial Leverage, Risk, Systematic Risk, Coefficient of Sensitivity

INTRODUCTION
Common Stock is one of the financial media which may result in doubts amongst the investors because of uncertainty about the future return. Therefore the situation should be provided for the investors and company directors to make them informed about the capital market and make them familiar with all the influential factors on investment, help them preferentially in decision making, all of which may be effective in booming the capital market.
Risk and return are two key factors of investment, the return gained by an investor is not predictable, and so he might be inevitable of undergoing the risks. On the other hand, in a rational investment, the unsystematic risks would be reduced or eliminated with the variety of investments and industries. In any investment, in fact, the risks and returns should be carefully focused on.
The financing funds are the most challenging duty of the chief financing managers, supplying the financing resources as getting loans and credit requires paying the principal on the maturity and also paying the interests in the obligated sections. The fixed financial costs as interests have caused the chief financial officers to consider the potentiality of the profiting unit in comparison to such costs as more important than past by using the financial leverage and calculating the leverage degree.

Problem Statement
- The return on investment bonus includes the current income and any increase or decrease in the assets that would express the income rate or an increase in assets with percentage. Therefore the return rate usually suggests the total annual income and the capital gain that is expressed based on the outlay percentage.
- The risk could be defined as the probability of the difference between the yield and the expected yield. Various types of risks are known in the financial literature. From one perspective, the risks could be divided into two categories. The first category involves the risks related to the internal factors of a...
company. These types are called non-systematic risks. The second category involves the risks which are not specified to one or some companies, but are related to all. This type of risk is called systematic risk. Leverage is actually the percentage of changes of the dependent variable divided by the percentage of the changes of the independent variable. The leverages are divided into two main branches, the first branch is the operational leverage and the second one is the financial leverage, which deals with the changes in the interests of ordinary shareholders against the volatility of EBIT. The aforementioned changes would be created through the issuance of the preferred share and borrowing. The combined leverage is a combination of the operational and financial leverages. No evaluation of the investment project can be performed without knowing about the minimum rate of return and the required risk for investment. On the other hand, whatever decisions or changes made or occurred in the company could be influential on the company's return and risk of the ordinary shares.

The posed questions of the research here are:
1- Are there any significant relationships between the systematic risk of portfolio and the return?
2- Are there any significant relationships between the systematic risk and the financial leverage with the portfolio returns?

**The Importance of Research**

Due to the fact that the industry sector is capital intensive, an efficient market is the most important necessity to the industrial development of a country, which would not be possible unless the financial instruments influential in the capital market are provided; so the exchanges which are recognized as the main and basic part in the capital market should be regarded as the bases of the productive and industrial parts of the country. One of the most important topics in the capital market is the systematic risk and return, especially the systematic risk which is believed to be the basis of the stock returns and the more systematic risk tolerance, the more returns would the investor achieve. Therefore, one can say that the systematic risk is an additional risk enduring of which is not influential to the investors. The importance of the present paper is that the relationship between the two concepts has two dimensions, one deal with the financial matters of the company and the other is related to the capital market and the investors. The positive relationship between the capital structure and the systematic risk of the ordinary shares has been proved in theory, and we know that the capital market is regarded as efficient in theory. When proving the relationship between the two, we can claim that the market has relationships with the existing variables of the theory.

**Objectives of the Research**

The explanation of the relationship between the systematic risk, returns, and the financial leverage as the theoretic basis are the scientific objectives of the present research. In this paper trying the acceptable scientific methods represented by the scholars in the literature and concepts of the financial and capital markets are based on the environmental information, on the basis of the information of the investigated companies, and so are its main aims. The functional objective of the present paper is meeting the needs of investors in shares of companies, managers of companies and institutes, organization of exchange burse, stock brokers, students and scholars.

**Literature Review and the Theoretical Frames of the Research**

Estimation and prediction of the prices of securities (financial assets) are specifically important in financial decision makings. Beta is a mathematical scale which studies and measures the systematic risk of an asset regarding its influences on a group of (portfolio) assets (Mohammadi, 2002-2004). This coefficient would be inferred from mathematical calculations, the greater the coefficient of sensitivity, the higher the risk level, and the smaller the coefficient, the less the risk level. This research was conducted by two researchers called Sharp and Cooper. They calculated the coefficient of sensitivity for the accepted stock in New York's burse and showed that the future coefficient of sensitivity could to some extent be predicted based on the historical coefficient of sensitivity. A researcher called Haha da proved that the debt has a direct relationship with coefficient of sensitivity. If the capital structure of a company can settle its debts through repaying the bonds, the
financial leverage will decrease and the reduction of the historical beta will be logically expected in comparison to past.

A researcher called Bandari proved that in addition to the systematic risk which is an influential factor in determining the stock returns, some other factors including the financial leverage would play an influential role. He introduced the multivariate linear regression model as a result. In the 1950s Harry Markowitz as the founder of modern portfolio drew the public attention to himself and stated that for calculating the portfolio risk it is necessary to measure the risks to the securities comprising the portfolio at first and the covariance is an absolute criteria of the degree of relationship between the return and a pair of securities.

Markowitz suggested that they should follow a simpler procedure, and instead of considering the securities one by one, they could compare the returns of individual securities to the general price indicator of the market and the capital asset pricing model (CAMP) or Sharp's theory of capital markets was derived from the heart of this proposal.


The research was conducted in a time span from 1964 to 1999 on NASDAQ stocks. Hence, he chose the stock used from 1973 onwards in that index as the statistical population. In that research, he focused his studies on 48 portfolios adjusted to the industrial categorization of Fama and MacBeth (1973). The results showed that the stocks enjoying very low correlation with the average return of market would produce more returns than what was expected, compared to the stocks that have positive correlation with the average return of market in the periods when the market return is declining or minus.

Karacby (2000) tested the CAMP model in Istanbul Stock Market. He was going to study the existence of a non-conditional relationship between risks and returns in his research. The previous studies showed that in cases where the market risk premium was positive, the market-risk relationship was positive too, and in cases where the market risk premium was negative, the market-risk relationship was negative as well.

Ho et al., (2006) in a study called "the impact of the conditional Beta pricing, the market size and the value to the book value of the Hong Hong stock exchange" studied the cases where the market was bullish or bearish. In that research, the three factors of size, beta, and book value were compared to the market value in conditional terms.

This research acknowledges that there is a conditional relationship in pricing the capital assets and states that in Hog Hong stock exchange some other factors as financial leverage and size (book value to the market value) are effective in description of returns. This study is in search of an important proof to support the conditional pricing influenced by beta, book size and value rather than the market value in Hong Hong Stock Exchange.

Ho et al., (2008) conducted a study called "the Corporate Financial Leverage and the capital pricing in Hong Hong Stock Exchange" that tried to develop the literature through testing the beta pricing along with other factors of risk. For that aim, they studied the financial leverage in situations where the market was bullish or bearish. The gathered data from this research suggests a relationship between the market leverage (the denominator of market value to the book value) and the conditional pricing in connection with returns.

In Iran, Mosadegh (2005) studied the relationship between risk and size with returns in various conditions of stock market. As a result, a multifactor model was tested in the conditional situation. In this study, a cross-sectional multivariate regression was used for studying the hypothesis.

This research showed that in order to explain the changes of return in periods where the market risk premium is positive and the market direction is upward, you can only make use of the company's variable size, and in periods where the market risk premium is negative and the market direction is downward for explaining the return changes you can make use of only a risk indicator variable (beta) and the relationship would be inverse.

Black et al., studied the ordinary shares listed in New York exchange burse carefully. The results showed that there was not any alignment between risk and return.
Mandell (1986) studied the impact of the financial leverage and the operational leverage on the systematic risk of the ordinary shares and came to this conclusion that there was a positive relationship between the systematic risk and the degree of financial leverage.

**Research Hypotheses**

First hypothesis: there is a significant relationship between the systematic risk and the portfolio returns.

Second hypothesis: there is a significant relationship between the financial leverage and the systematic risk with the portfolio returns.

**MATERIALS AND METHODS**

**Research Method**

The research method is Pearson's correlation and it deals with studying the relations of two or more factors.

**Research Model**

- The returns of any share would be calculated based on the opening and final prices of each period and also according to the ownership benefits of the shareholder in that period. The ownership benefits involve the amount of payable interest to the shareholder, raising the capital from the claims reserve, and increasing the capital from the cash reserve achievements of shareholders.

\[
R_{it} = \frac{P_{it} - P_{it-1} + D_{it} + sd_{it} + fd_{it}}{P_{it-1}}
\]

Where:

- \( P_{it} \): the return rate of share \( i \) in period \( t \)
- \( P_{it} \): the share price \( i \) in period \( t \)
- \( P_{it-1} \): the share price \( i \) in period \( t-1 \)
- \( D_{it} \): payable interest amount to the shareholder in period \( t \)
- \( sd_{it} \): capital increase through the reserves or reclaims
- \( fd_{it} \): capital increase through the cash reserve achievements

The portfolio returns of market based on the total stock index are calculated as follows:

\[
R_m = \frac{\text{the opening stock index} - \text{the final stock index}}{\text{the opening stock index}}
\]

\( R_p \) (portfolio return) is calculated by the weighted average of the return rate using the following formula:

\[
R_p = \frac{\sum_{i=1}^{n} R_{it}}{n}
\]

Coefficient of sensitivity is calculated using SPSS and with \( R_p \) and \( R_m \). In this research the radix of calculating the coefficient of sensitivity is the determination of the minimum squares of the linear regression. The regression line is calculated as follows:

\[
R_p = \alpha_p + \beta R_m + e_p
\]

This calculation states that if a unit is added to the market return, the rate of portfolio return will be added to the systematic risk size.

The financial leverage is the amount of using debt for financing the assets.

\[
\text{Financial leverage} = \frac{\text{debt}}{\text{assets}} \iff FL = \frac{D}{TA}
\]

For the second hypothesis that is related to studying the relationship between the financial leverage, the systematic risk and the portfolio returns, we use the multiple regressions.

\[
R_p = \alpha_p + \beta R_m + \theta FL_p + e_p
\]

And for calculating \( FL_p \), the following formula is used:

\[
FL_p = \frac{\sum_{i=1}^{n} FL_{it}}{n}
\]

\( FL_{it} \): the company's financial leverage \( i \) in period \( t \)

**Population and Sampling**

The target population in this paper is the Automotive Industry, Cement and Petrochemical companies which have been accepted in Tehran Stock Exchange.
The statistical sample is considered to be equal to the statistical situation and the research data involve the opening and final prices of every period along with the dividend, the benefits of preference shares, the benefits of bonus shares, total assets, total debts, and the stock indicator from 2006-2013.

**Research Tools**

The financial statements of the investigated companies along with the attached notes and the reports from around the Tehran stock market are the general tools of gathering information for the present paper.

**Variables of Research**

For hypothesis 1, the portfolio return was considered as the dependent variable and the relative risk indicator, which is the coefficient of sensitivity, as the independent variable.

In hypothesis 2, the portfolio return was considered as the dependent variable, the relative risk indicator (coefficient of sensitivity), and the financial leverage as the independent variables.

**Hypotheses Testing**

For testing the research hypotheses, we used Pearson correlation method.

**RESULTS AND DISCUSSION**

**Findings**

Model 1:

\[ R_p = \alpha_p + \beta R_m + e_p \]

Since the intercept is not significant at five percent level, regarding that \( R = 0.868 \), there would be a direct relationship between the dependent and independent variables, which is a strong correlation; the model is fitted out once more without interception. \( R^2 = 0.753 \) shows that for one percent of change in the independent variable, the dependent variable would change as much as 0.753. As for the presented values of \( t \) and \( f \), there would not be a constant value at the level of significance in the regression equation. However, we tested the model regardless of the interception and assuming 95% assurance and the error level of 5%, the statistical null hypothesis between the systematic risk and the portfolio returns would be rejected.

Model 2:

\[ R_p = \alpha_p + \beta R_m + \gamma FL_p + e_p \]

Since the interception is insignificant at 5 percent level, we refitted the model without any interception. The model was significant at ten percent level for both dependent variables. Regarding the calculated value of \( R = 0.954 \), there would be a direct relationship between the dependent and independent variables, and with regard to \( R^2 = 0.910 \), some changes would occur in the dependent variable; because of the presented values in \( f, t \), and their significance level with 10 percent of error level and 90% of assurance, the statistical null hypothesis would be rejected and the relationship between the financial leverage and return would be confirmed. Entering the independent variable of the financial leverage to model 1 and posing model 2, the influential factors on return would be the financial leverage and the systematic risk as well.

**Results**

As you can see in the research, there is a significant relationship between the coefficient of sensitivity and the portfolio stock return; that is we may explain the portfolio return based on the coefficient of sensitivity. The value of \( R^2 = 0.753 \) shows that 75.3 percent of the changes in portfolio returns would be stated through the systematic risk and 24.7 percent of the changes are related to non-systematic risks. There is a significant relationship between the financial leverage, the systematic risk and the portfolio returns too; that is, the portfolio return can be explained based on the financial leverage and the systematic risk. In fact, by adding the independent variable of financial leverage to model 1 and posing model 2, the independent variables of financial leverage and systematic risks may explain 91 percent of the changes in the portfolio return.

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