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Investigate the Relationship of Industry, Size and Profitability Type with Capital Structure (Case Study of Listed Companies Tehran Stock Exchange During the 2008-2014)

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Abstract: This study has been done with the aim of evaluate appointment of its relationship and size and limit between two or more quantitative variables (firm size, industry type, profitability). Methodology is type of correlation that the purpose of potential correlation study between these variables is establishing a relationship, or lack of that and applying the relationships in doing forecasts. Statistical population includes companies listed on the Tehran Stock Exchange in the five industries "vehicle and manufacturing the parts", "pharmaceutical materials and products", "investments", "basic metals" and "electronic machineries" in time interval of 2008-2014. During the period of financial information relating to 35 companies in 2008-2014 were evaluated that were selected by using relative classification sampling. Statistical data show that capital structure is not the same in different industries and the amount of assets and profitability of companies is associated with type of capital structure but the rate of sale has no effect on capital structure. In the next step through multiple regression effect these factors was investigated once on the capital structure which shows that internal factors of the companies has effect on capital structure and there is a relationship between them. So, financial managers must consider their domestic factors during financing in order to achieve an optimal capital structure to increase the value of their company.

Key words: Capital structure, earnings per share, size, industry, optimal capital structure

INTRODUCTION

One of the most important components of any economic activity is providing the required financial resources. Required financial resources can be provided from shareholder's equity or debt. The basic question is which of these resources should be applied in a lifetime economic agency?

Operation's flexibility of a company depends to some extent on the ability of the company in accessing to existence with reasonable cost and without encountering with prohibitive obstacles. A company that has access to resources will be less threatened by its business competitor. If a company find an access to the appropriate financial resources, it will send this message to competitors, customers and interest groups that company is financially in a favorable situation and has a great power and can effectively retaliate (Azar and Momeni, 2006).

Provision of various financial resources is considered one of the key pillars of the company's financial strategy. Each company must have access to such source of financing to reduce its dependence on pure markets. Companies determine their capital structure after analyzing several factors. Management should specify the cost of several financial resources and determine the effects that these resources have on returns and operational risk of the company in order to determine the appropriate financial resources (Ahmadzadeh *et al*., 2005).

What has a great importance in making decisions related to the financing is attention to the effects that will be ultimately on returns and quantitative value of company in the case of choosing each of the financing methods. This is realized only if can find out original nature and characteristics of each of the methods of financing.

As since the early 1960s, investigation of companie's capital structure was focused by researchers in a new and scientific way. Modigliani and Miller stated for the first time that with the assumption of market efficiency, capital structure is not considered the main factor in determining the value of the company. This procedure and several other hypotheses so far have been able to examine efficiency of several methods of financing in economic environment and changing conditions of the companies in a scientific and empiric method. Reviewing process of researche's scientific method shows that they have shown only a part of the whole process so far. As a result, choosing explanatory variables on the factors affecting the type of financing is difficult (Myers and Majluf, 1984).

Bagherzadeh in a research intended to determine pattern of capital structure of companies listed on the Tehran Stock Exchange. The mentioned results that had been taken place in temporal domain of 1998-2002 and a sample consisted of 158 manufacturing companies indicate that these companie's capital structure follows variables such as the amount of fixed assets of company, company size and profitability (Bagherzadeh, 2003).

Namazi has investigated the effect of capital structure of companies of Tehran Stock Exchange on returns and risk. They divided the companies into two samples: Companies that have used credits to provide their required funds (in total, 46 companies) and companies that have issued shares to provide their required funds (in total, 60 companies). Then they calculated stock returns of the first and second sample companies for the years 1996-2001 and obtained average of total returns of both statistical samples. They concluded that financing method has not had significant effect on stock returns of the studied companies by using T test at confidence level of 95% (Namazi and Shirzadeh, 2005).

The research of Hassan Ghalibaf Asl entitled "Evaluation of Effect of Capital Structure on the Risk of Common Stock of Companies Listed on Tehran Stock Exchange; Yadollah Noruzinia's research entitled "Calculation of Cost of Collecting Money at Iran Commercial Banks and Evaluation of its Relationship with the Bank Granted Facilities"; Hassan Kamalabadi's research in the field of "Investigation of the relationship between ratio of debt and cost of capital of companies listed on Tehran Stock Exchange" in Tehran University Faculty of Management as well as the research of Zahra Nasrollahi entitled "Estimating Cost of Capital for Companies Listed on Tehran Stock Exchange" can be mentioned of the other researches that have been done in this field.

Studies of Ritterfeldt (2007) in the field of decisions of capital structure in the transportation industry show that "companies require domestic and foreign financial resources in order to conduct their business. On the other hand the conducted studies in transportation industry indicate the relationship between capital structure and cost of capital in this industry.

Simerly and Mingfang (2000) in an study examined the relationship between economic performance and the use of debt based on environmental dynamisms. Their findings showed that the industries that have a high level of dynamism will be successful if they have low level of debt. In other words, debt has a negative relationship with the efficiency and profitability of these industries. Loaners has slight tendency to invest in long-term projects in dynamic conditions.

Frank and Goyal (2003) investigated financing, pecking order theory on great numbers of American business companies. The results of these investigations in large companies showed attention to debt from the dimensions of financing, pecking order theory while strong evidences were not obtained in the field of attention to leverage in financing. In other words, deficit of financing is less important than the companie's use of debt.

Researches on capital structure at any point of time only depict a part of reality. For this reason, various researchers have achieved dissimilar results based on the situation and different cultural and economic environments in investigating the effect of company's internal and external variables on capital structure. In conducted researches, the researchers believe that leverage profitability is affected by four key variables: growth opportunities, size, profitability and famous assets.

Most empirical studies assume that the effect of specific variables of company on capital structure appears similar among companies with different degree of financial leverage. But researches have been also done on different treatment of managers of leverage and non-leverage companies with various financing resources. Generally, the results of most researches have been done so far suggest that specific factors for each company may have different effect on choosing desirable capital structure.

MATERIALS AND METHODS

Main purpose of this study is to determine the relationship and size and extent of that between two or more quantitative variables (firm size, industry type, profitability). The aim of potential correlation study between these variables is the establishing a relationship or lack of it and applying the relationships in doing forecasts.

Hypotheses:

- There is a relationship between the industry type and its capital structure
- There is a relationship between the size of the company (book value of assets of the company) and capital structure
- There is a relationship between company size (sale rate) and capital structure
- There is a relationship between profitability and capital structure
- There is a relationship between domestic factors of companies (industry type, company size and profitability) and capital structure

Table 1: Different classes of statistical population and samples selected from each class

Industry	Number of companies available in each industry	The weight of each industry compared to the entire industry	Sample size of each industry
Vehicle and parts manufacturing	30	0.286	10
Pharmaceutical materials and products	26	0.247	9
Investments	12	0.115	4
Basic metals	26	0.248	9
Machineries for electric machines	11	0.105	3
Total	105	1.000	35

Population and statistical sample: Statistical population includes companies listed on the Tehran Stock Exchange in the five industries "vehicle and manufacturing the parts", "pharmaceutical materials and products", "investments", "basic metals" and "electronic machineries" in time interval of 2008-2014. Due to the fact that the consideration of all members of the population under studied leads to the creation of vast amounts of information, must inevitably resort to sampling in the population. The following formula has been used to determine sample size:

$$n = \frac{N \times z_{\frac{\alpha}{2}}^2 \times P(1-P)}{\varepsilon^2 (N-1) + Z_{\frac{\alpha}{2}}^2 \times P(1-P)}$$

Sample size: In this case, statistical assumptions are as follows:

- Since, the p = 0.5 provides the highest number of samples as one of the assumptions has been intended
- $\alpha = 0.5$ has been considered
- ε that is a measure for estimation accuracy has been intended as 0.1 in this study

Total companies in five industries under study is N = 105. The sample size (n) has been achieved as 51 by replacing the numbers connected in the above equation. Since, the sample size (n) obtained is >5% the population (n) has been adjusted by using following equation:

$$n = \frac{n}{1+\frac{n}{N}} = \frac{51}{1+\frac{51}{105}} \approx 35$$

Therefore, sample size of 35 companies has been estimated. Relative classification sampling has been used order to that the desired samples in comparsion with existing companies in each industry to be selected (Table 1).

Tools, methods and resources for collecting data: The library studies and historical data have been used to establish the chapter on research literature and theoretic arguments. Historical data required has been extracted from Rahavard Software and SPSS and Excel has been used for analysis of statistical data.

RESULTS AND DISCUSSION

Data analysis

Descriptive statistic: Assets, sales and rate of return on assets as the independent variable and the debt ratio have been considered as dependent variable to test the research hypotheses.

In the first step their correlation coefficient has been calculated to find out the presence or absence of relationship between them. The formula used to calculating the correlation coefficient is as follows. Correlation coefficient:

$$r = \frac{\sum xy - n\bar{x}\bar{y}}{\sqrt{\sum x^2 n\bar{x}^2}\sqrt{\sum y^2 - n\bar{y}^2}}$$

Determination coefficient:

$$r^2 = \frac{a\sum y + b\sum ny - n\bar{y}^2}{\sum y^2 - n\bar{y}^2}$$

χ-test has been used to test the first hypothesis. Because just debt ratio to be tested as an index for the capital structure. Each of industry groups is coded for this purpose and through Kruskal-Wallis test, we tested it. We consider the first hypothesis as:

- H_0: the companie's capital structure is the same in different industries of stock
- H_1: capital structure of companies is not the same in different industries of stock

This is statistically defined as follows:

$$\begin{cases} H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 \\ H_1: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \end{cases}$$

Table 2: Results of similarity hypothesis of capital structure

Years	2008	2009	2010	2011	2012	2013	2014
Chi-square	12.73	10.783	11.47	13.341	13.431	12.024	17.029
Sig.	0.000	0.029	0.000	0.000	0.000	0.000	0.000
H_0	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected	Rejected

Table 3: Being independent hypothesis of assets from capital structure

Years	2008	2009	2010	2011	2012	2013	2014
R	0.615	0.546	0.426	0.332	0.343	0.34	0.363
R^2	0.378	0.298	0.182	0.111	0.188	0.116	0.132
t-test	-4.267	-3.627	-2.581	-1.962	-2.683	-2.014	-2.167
Sig.	0.000	0.001	0.015	0.059	0.012	0.053	0.038
H_0	Rejected	Rejected	Rejected	Accepted	Rejected	Accepted	Rejected

Table 4: The relationship between sales and capital structure

Years	2008	2009	2010	2011	2012	2013	2014
R	0.071	0.051	0.016	0.003	0.007	0.062	0.044
R^2	0.005	0.003	0	0	0	0.004	0.002
t-test	-0.391	-0.282	-0.088	-0.015	0.038	-0.343	0.246
Sig.	0.699	0.78	0.93	0.988	0.97	0.734	0.807
H_0	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted	Accepted

computational data related to debt ratio as the dependent variable and the data related to the book value on assets, sale rate and rate of return on assets have been considered as independent variables to test the hypotheses of two, three and fourth of research. We test them to determine the being significant of correlation coefficient. The purpose of this test is that we want to know:

- H_0: correlation coefficient is zero in population
- H_1: correlation coefficient is not zero in population

$$\begin{cases} H_0: \rho = 0 \\ H_1: \rho \neq 0 \end{cases}$$

The use of t-student is appropriate statistic in this case and in test there is a significant relationship between dependent and independent variable if H_0 to be rejected.

Well as we have three independent variables and one dependent variable in the fifth hypothesis and the multivariate linear regression has been used for this reason and the effect of all independent variables is calculated on the dependent variable. Multiple correlation coefficient show that what extent the intensity of the relationship between independent variables with the dependent variable in general.

Fisher test has been used to determine the existing the significant relationship independent variables and the dependent variable. The last hypothesis is posed like this:

- H_0: there is no significant relationship between independent variables and the dependent variable
- H_1: there is a significant relationship between independent variables and the dependent variable

Inferential statistic (testing hypotheses)

First hypothesis: As can be seen in Table 2 through Kruskal-Wallis debt ratio of selected companies of Tehran Stock Exchange in five industries of "vehicles and manufacturing the parts", "pharmaceutical materials and products", "investments", "basic metals "and" electronic machines "were studied during years between 2008 and 2014 to see that have they the same capital structure or not?

As can be seen H_0 hypothesis is rejected that shows similarity of capital structure in various industries. So in these years capital structure of companies in different industries has been not same on the stock exchange.

Second hypothesis: T-student test has been used for the second hypothesis that reflects the existence of relationship between book assets rate of companies and capital structure. Assumptions was consider in this way that are independent or dependent the intended assets and debt ratio that has been chosen as a capital structure index. The results for the years of 2008-2014 have been summarized in Table 3.

As can be seen in Table 3, H_0 hypothesis in years of 2008, 2009, 2010, 2012 and 2014 has been rejected means the assets and debt ratio in these years are interdependent in different industries and in years of 2011 and 2013, these two variables are independent and have no relationship with each other.

Third hypothesis: T-student has been used for third hypothesis that reflects the existence of relationship between sales rate of companies and capital structure and we consider assumption in such a way that the sales and debt ratio that has been chosen as capital structure index are interdependent or dependent. The results of this test for years of 2008-2014 have been shown in Table 4.

Table 5: The return on assets rate as profitability rate and debt ratio

Years	2008	2009	2010	2011	2012	2013	2014
R	0.244	0.545	0.505	0.454	0.56	0.303	0.623
R^2	0.06	0.297	0.255	0.206	0.313	0.092	0.389
T-test	-1.424	-3.732	-3.310	-2.925	-3.878	-1.830	-4.581
Sig.	0.164	0.001	0.002	0.006	0.000	0.076	0.000
H_0	Accepted	Rejected	Rejected	Rejected	Rejected	Accepted	Rejected

Table 6: Results of the fifth hypothesis

Years	2008	2009	2010	2011	2012	2013	2014
R	0.742	0.768	0.684	0.791	0.672	-	0.717
R^2	0.551	0.59	0.454	0.629	0.451	-	0.514
F-values	12.274	14.856	8.329	17.281	8.498	-	10.931
Sig.	0.000	0.000	0.000	0.000	0.000	-	0.000
H_0	Rejected	Rejected	Rejected	Rejected	Rejected	-	Rejected

Table 7: Effect of factors on capital structure

Years	R	R^2	F-values	df	Sig.	H_0
87	0.742	0.551	12.274	33	0.000	Rejected
88	0.768	0.590	14.856	34	0.000	Rejected
89	0.674	0.454	8.329	33	0.000	Rejected
90	0.791	0.629	17.271	34	0.000	Rejected
91	0.672	0.451	8.489	34	0.000	Rejected
93	0.717	0.514	10.931	34	0.000	Rejected

92: In 2005 H_0 is accepted because there is no correlation between the variables. So, there is no relationship between capital structure and asset, sales and profitability and multiple correlation coefficient between them is not significant at 95% confidence level; confirmed

As can be seen in Table 3, H_0 hypothesis has been accepted in all years of under study that show sales variables and debt ratio are interdependent and have no relationship with each other.

Fourth hypothesis: t-student has been used for fourth hypothesis that reflects the existence of relationship between profitability of companies and capital structure and we consider assumption in such a way that the return on assets rate as profitability rate and debt ratio that has been chosen as capital structure index are interdependent or dependent. The results of this test for years of 2008-2014 have been shown in Table 5.

As can be seen in Table 5, H_0 hypothesis has been rejected in years of 2009, 2010, 2011, 2012 and 2014 means the return on assets ratio and debt ratio in these years are interdependent in different industries and H_0 has been accepted in years of 2008 and 2013, this means that in two years the rate of return on assets and debt ratio is associated and the rate of return on assets has effect on the ratio of debt.

Fifth hypothesis: Fisher test has been used for fifth hypothesis that reflects the effect of profitability of companies, assets and sales ratio on the capital structure and we consider assumption in such a way that is there any relationship between profitability of companies, assets and sales as independent variables and debt ratio as dependent variable. The results of this test for years of 2008-2014 have been shown in Table 6.

As can be seen in Table 6, H_0 hypothesis is rejected in all years except for 2013. This indicates that rate of returns of companie's assets, amount of assets and sale in these years as independent variables affect the capital structure. The amount of this effect varies in different years.

The results obtained from multiple correlation coefficient between variables of multiple correlation coefficient among these variables, dependent variable (debt ratio) and independent variables means asset, sale and returns of assets indicate that existence of multiple correlation coefficient between variables is significant according to values of p-value that its information has been brought in Table 7. H_0 hypothesis is accepted in 2014 because there is no correlation between the variables. So, there is no relationship between capital structure and asset, sale and profitability. Multiple correlation coefficients between them are not significant at confidence level of 95%.

Adjusted coefficient of determination was calculated in order to fit the best regression model between assets, sale and profitability factors and capital structure. Adjusted coefficient of determination is a criterion that fines the user and reduces its amount in the case of additional variable entering the model. Low difference between coefficient of determination and adjusted coefficient of determination shows propriety of the model.

The difference between the coefficient of determination and adjusted coefficient of determination is little in 2011 according to the information in Table 8 which can indicate this sense that multiple regression model fitted in 2011 is the best model for predicting and explaining the relationship between assets, sale and profitability with capital structure.

Table 8: Multiple regression model

Years	Determination coefficient	Adjusted coefficient of determination	SE of errors
87	0.551	0.506	0.1446647
88	0.590	0.550	0.1292894
89	0.454	0.400	0.1445698
90	0.626	0.589	0.1060000
91	0.451	0.398	0.1363000
92	0.140	0.086	0.1908000
93	0.514	0.467	0.1612000

Table 9: Line equation of multiple regressions

Years	Linear regression equation
87	$Y = 0.725-0.0000005X_1+0.0000009X_2-0.490X_3$
88	$Y = 0.754-0.0000003X_1+0.00000048X_2-0.652X_3$
89	$Y = 0.793-0.0000001X_1+0.00000015X_2-0.801X_3$
90	$Y = 0.797-0.0000001X_1+0.00000015X_2-0.669X_3$***
91	$Y = 0.824-0.00000003X_1+0.000000042X_2-0.922X_3$
93	$Y = 0.779-0.00000002X_1+0.000000023X_2-1.142X_3$

92: In 2005 H_0 is accepted because there is no correlation between the variables. So, there is no relationship between capital structure and asset, sales and profitability and multiple correlation coefficient between them is not significant at 95% confidence level

Calculation's results related to the regression of these variables have been brought in Table 9 in which Y is dependent variable (debt ratio) and X_1-X_3 are independent variables of asset, sale and returns of assets, respectively. The best fitted model is equal to:

$$Y = 0.797-0.0000001X_1+0.00000015X_2-0.669X_3$$

This is because coefficient of determination and adjusted coefficient of determination are close together and have the highest value among all other models. On the other hand, standard deviation of its error is also the lowest. So, it is as the best predictive model.

CONCLUSION

It can be concluded based on the results obtained from this research that capital structure is not alike in different industries. It can be also concluded about the existence of relationship between assets and capital structure concluded that they have relationship. But there is no relationship between sale and capital structure. There is a significant relationship between profitability and capital structure. In general it can be concluded that internal factors have an effect on the capital structure. It is also completely clear according to the results obtained from this research that financial managers should do financing according to the necessity of realization of matching principle. Therefore, method and amount of financing is done according to the type of required assets of company. This leads to a reduction in the overall cost of capital and gaining more reasonable returns, considering to the conducted analysis of benefits and costs. Companie's major existing debts are current liabilities and their long-term debts are storing employee's service life in most cases.

Therefore, decisions on long-term investment through debts that affect profitability in the long term cannot be properly made in such conditions. Lack of similar definitions of the variables related to profitability by stock companies, not following uniform procedures and applying accounting methods lead to the emergence of different figures related to the companie's profit. Different figures of profit, even for a company during few years may be only the result of changes in different accounting methods and not related to changes in profit because of optimizing economic resources of the companies.

Legal restrictions on issuing long-term debentures and its unacceptability by customers as well as banking high interest rate can hinder companie's access to optimal combination of capital and thus profitability. Manager's risk aversion can also be considered an important factor in this field, because having a spirit of risk aversion leads to lack of debt's creation and use of long-term credits. This also reduces the risk and thus profitability returns.

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