

Investigating different influential factors on capital structure of different sectors of industries listed in Tehran Stock Exchange

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ABSTRACT

Capital structure plays an important role on market growth investigation. In this paper, we investigate the relationship between capital structure as dependent variable and seven independent variables including tax rate, firms' growth rate, fixed assets, firms' size, operating risk, profitability and industry type. The proposed study of this paper uses the financial information of 107 selected companies from 18 different industries listed on Tehran Stock Exchange over the period of 2004-2011 covering 40% of total number of companies listed in this stock exchange. We use ordinary least square technique to study the relationships. The results of the survey indicate that there is a positive relationship between tax rate and firm's growth rate, and capital structure. The result of the survey also indicates there is a negative relationship between firm's profitability and capital structure. However, there is no evidence to believe that there was any relationship between fixed assets and capital structure. We have also concluded that there was a negative relationship between firm's profitability and capital structure but the results of our survey did not indicate that there was any difference between the mean of profitability in various sectors.

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1. Introduction

Capital structure plays an important role on financial performance of the stock market and there are literally different works dedicated on the effects of various factors on it (Lahmiri, 2012). Azouzi, and Anis (2012), for instance, investigated the determinants of firms' investment introducing a behavioral perspective, which has received little investigation in corporate finance literature. They discussed that investment decisions were influenced not only by their fundamentals but also they depended on some other influencing factors. One factor was the biasness of any CEO to their investment, biasness depended on the cognition and emotions, because some leaders used them as heuristic for the investment decision instead of fundamentals. The study showed how CEO emotional bias

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(optimism, loss aversion and overconfidence) influenced the investment decisions. The paper used Bayesian Network Method to investigate this relationship. Emotional bias had been measured by means of a questionnaire comprising several items. As for the selected sample, it has been composed of some 100 Tunisian executives. The results revealed that the behavioral analysis of investment decision implies leader had affected by behavioral biases (optimism, loss aversion, and overconfidence) adjusts its investment choices based on their ability to assess alternatives (optimism and overconfidence) and risk perception (loss aversion) to generate of shareholder value and ensure its place at the head of the management team.

de Jong et al. (2008) analyzed the relative importance of firm-specific and country-specific items in the leverage choice of firms from 42 different countries around the world. Their investigation yielded two new results. First, they reported that firm-specific determinants of leverage differ across various countries, while prior studies implicitly had assumed equal effects of these determinants. Second, they demonstrated that there was an indirect effect because country-specific factors also impacted the roles of firm-specific determinants of leverage. Delcours (2007) performed an investigation to find out whether capital structure determinants in emerging Central and Eastern European (CEE) countries support traditional capital structure theory developed to explain western economies. The study reported that companies followed the modified “pecking order.” The factors, which influence firms' leverage decisions were the differences and financial constraints of banking systems, disparity in legal systems governing firms' operations, shareholders, and bondholders rights protection, corporate governance and sophistication of equity and bond markets.

Singh and Nejadmalayeri (2004) examined the relationship between financial structure, international diversification and their individual and interactive implications for the combined debt and equity expenditure of capital for some French corporation. They reported that the degree of international diversification positively associated with higher total and long-term debt ratios. The survey also recommended a non-linear inverted U-shape relationship between the degree of international diversification and short-term debt financing. They found that internationally diversified firms supported higher level of debt financing, which directly results in reduction of overall cost of capital despite higher equity risk. They also reported that even after controlling for the impacts of risk, firm size, managerial agency costs, the degree and composition of debt financing, equity and asset structure, higher degree of international diversification resulted in lower overall—combined debt and equity—cost of capital.

According to Chang et al. (2009), long-term debt is the most important proxy of capital structure, followed by short-term debt, and then convertible debt. Taboada (2011) studied the effect of changes in bank ownership structure on the allocation of capital based on some international evidence. Taboada (2011) provided some evidence that foreign presence could improve capital allocation efficiency by increasing lending to more productive industries, primarily in common law countries. Tongkong (2012) investigated key factors impacting capital structure decision and its speed of adjustment of Thai listed real estate companies. The results of the survey indicated that firm leverage was positively associated with median industry leverage. Furthermore, firm size and growth opportunities had positive relationship with firm leverage, whereas profitability and leverage were negatively related. The results supported pecking order theory as higher profitability firms tend to have less debt and corporations with higher growth opportunities tend to have bigger leverage. Additionally, the study also discovered that real estate companies partially adjust their capital structure towards the target level capital structure only at the rate of 63%.

Kolasinski (2009) reported that subsidiaries were more likely to have their own external debt when they had fewer growth options and higher cash flow than the rest of the firm. Kesternich and Schnitzer (2010) investigated how multinational firms selected the capital structure of their foreign affiliated in response to political risk. They concentrated on two choice variables, the leverage and the ownership structure of the foreign affiliate and distinguished various kinds of political risk, such as

expropriation, unreliable intellectual property rights and confiscatory taxation. In their theoretical analysis they found that, as political risk increases, the ownership share tends to decrease, whereas leverage could both increase or decrease, depending on the type of political risk.

Guney et al. (2011) analyzed the relationship between product market competition and the capital structure of Chinese listed firms in a static and dynamic setting. They studied an unbalanced panel dataset of 10,416 firm-year observations in 12 industries over the period 1994-2006. They reported that there were significant differences in the debt ratios and product market competition across various industries. They suggested that the relationship between leverage and product market competition was non-linear, depending on industry kind, company size and firms' growth opportunities. The system-GMM results revealed that Chinese firms tend to adjust their leverage ratios through time.

Khodaei Valahzaghgard and Babaei dazghei (2012) presented an investigation to measure the effect of financial and macro economical factors on capital adequacy. They gathered the necessary information from financial statements and balance sheets of nine Iranian private banks over the period of 2005-2011. The results of analyzing the data based on the implementation of linear regression technique disclosed that there were some meaningful relationship between financial figures, including bank size and profitability, and capital adequacy. However, the survey did not indicate any relationship between macro economical factors, including growth domestic product and inflations, and capital adequacy.

2. The proposed study

The proposed study of this paper uses the financial information of 107 selected companies from 18 different industries listed on Tehran Stock Exchange over the period of 2004-2011 covering 40% of total number of companies listed in this stock exchange. The proposed study examines the following seven hypotheses,

H₁: There is a positive relationship between effective tax rate and capital structure.

H₂: There is a positive relationship between firms' growth rate and capital structure.

H₃: There is a positive relationship between fixed assets and capital structure.

H₄: There is a positive relationship between firms' size and capital structure.

H₅: There is a positive relationship between operating risk and capital structure.

H₆: There is a negative relationship between profitability and capital structure.

H₇: There is a positive relationship between industry type and capital structure.

The proposed study of this paper uses regression analysis where capital structure (TDR) is dependent variable and effect tax rate (TAXR), firm's growth rate (GROR), fixed assets (FIX), firm size (SIZE), operating risk (OPR), profitability (PROR) and industry type (INDUS) are independent variables. The proposed study of this paper uses panel data for regression analysis and Table 1 shows basic statistical observations of the selected firms.

Table 1

Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
TDR	856	.00	1.14	.6417	.15929	-.422	.084	.172	.167
FIX	856	.00	.94	.2493	.17788	1.045	.084	1.028	.167
GROR	856	-1.00	2.18	.1853	.33783	1.853	.084	7.433	.167
INDUS	856	1.00	18.00	5.8224	4.38352	.797	.084	-.259	.167
OPR	856	.08	2.99	.5206	.33841	1.891	.084	5.669	.167
PROR	856	-.31	1.06	.1757	.14473	1.261	.084	2.982	.167
SIZE	856	4.43	7.90	5.6824	.60638	.813	.084	.854	.167
TAXR	856	.00	.91	.1258	.08855	.687	.084	6.065	.167

Before we use regression analysis, we need to make sure that the data are normally distributed. The results of the implementation of Kolmogorev-Smirnov Test are summarized in Table 2 as follows,

Table 2

The results of One-Sample Kolmogorev-Smirnov Test

	TDR	Resid
N	856	747
Normal Parameters ^{a,b}		
Mean	0.6417	0.0000
Std. Deviation	0.15929	0.11331
Most Extreme Differences		
Absolute	0.035	0.042
Positive	0.032	0.037
Negative	-0.035	-0.042
Kolmogorev-Smirnov Z	1.010	1.139
Asymp. Sig. (2-tailed)	0.259	0.149

As we can observe from the results of Table 2, the level of significance for TDR and Resid are 0.259 and 0.149, respectively and none of them is less than 0.05. Therefore, we can conclude that they are normally distributed. We have also used Hausman Test to find out whether we should use fixed or variable method and the test examines the following hypothesis,

$$\begin{cases} H_0 : & \text{Random effects} \\ H_1 : & \text{Fixed effects} \end{cases}$$

The Hausman test calculates the following ratio to perform the test,

$$H = n\hat{q}'(Avar(\hat{q}))^{-1}\hat{q}, \quad (1)$$

where \hat{q} is the estimated difference for descriptive variables, $Avar$ represents the variance of observations and n is the number of observations. The results of Hausman test on cross-section random test yields Chi-Square value of 77.372047 with P-value of 0.0000. Therefore, the null hypothesis is rejected and we can conclude that it is better to use fixed effect method for regression analysis. The proposed model of this paper uses the following regression model,

$$TDR = \beta_0 + \beta_1 \text{FIX}_{it} + \beta_2 \text{GROR}_{it} + \beta_3 \text{SIZE}_{it} + \beta_4 \text{OPR}_{it} + \beta_5 \text{PROR}_{it} + \beta_6 \text{TAXR}_{it}, \quad (2)$$

where $\beta_0, \beta_1, \dots, \beta_6$ are parameters of regression analysis and they are estimated based on the implementation of ordinary least square technique. We first present details of ANOVA test to verify whether the linear model is suitable or not and the details of our survey are summarized in Table 3.

Table 3

The results of ANOVA test

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	5.687	6	.948	50.272	.000 ^a
Residual	16.007	849	.019		
Total	21.694	855			

The results of ANOVA test indicate that F-value is statistically meaningful, when the level of significance is five percent and we can conclude that the null hypothesis is rejected and there are some linear relationship between independent variable and dependent variables. Table 4 shows details of our survey on regression analysis using Panel EGLS (Cross-section weights).

Table 4

The summary of regression analysis using cross-section weights method

Parameters	Coefficient	Std. Error	t-Statistic	Prob.
C	1.030532	0.113732	9.061058	0.0000
FIX	0.025701	0.037628	0.683030	0.4948
GROR	0.014162	0.006216	2.278117	0.0231
PROR	-0.456229	0.043406	-10.51080	0.0000
OPR	-0.000110	0.000343	-0.320039	0.7490
SIZE	-0.059617	0.019364	-3.078791	0.0022
TAXR	0.132262	0.030809	4.292958	0.0000
AR(1)	0.380320	0.033241	11.44133	0.0000

As we can observe from the results of Table 4, statistical t-student associated with GROR, PROR, SIZE and TAXR are statistically meaningful when the level of significant is five percent. However, t-student values associated with FIX and OPR are not statistically meaningful when the level of significance is five percent. Table 5 shows details of other statistical observations associated with weighted and un-weighted statistics.

Table 5

The summary of statistical observations of weighted and un-weighted

Weighted			
R-squared	0.881560	Mean dependent var	1.005814
Adjusted R-squared	0.860483	S.D. dependent var	0.676045
S.E. of regression	0.088994	Sum squared resid	5.029156
F-statistic	41.82625	Durbin-Watson stat	2.019079
Prob(F-statistic)	0.000000		
Un-weighted			
R-squared	0.718552	Mean dependent var	0.639714
Sum squared resid	5.435047	Durbin-Watson stat	1.949138

According to Table 5, R^2 is 0.88 for weighted and 0.72 for un-weighted regression models, which means the results can describe a significance portion of changes in dependent variable. In addition, Durbin-Watson ratios for weighted and un-weighted regression models are 2.019 and 1.949, which means there is not auto-correlation among residuals.

3. The results

In this section, we present details of our findings to test seven hypotheses.

3.1 *The first hypothesis: Tax rate and Capital structure*

Based on the results of Table 4, we can observe that there is a positive and meaningful relationship between tax rate (TAXR) and capital structure when the level of significance is five percent. Therefore, the first hypothesis is confirmed. In other words, an increase of one unit on tax rate will increase capital structure by 0.132262.

3.2 *The second hypothesis: firms' growth rate and capital structure*

Based on the results of Table 4, we can observe that there is a positive and meaningful relationship between firms' growth rate and capital structure when the level of significance is second percent. Therefore, the first hypothesis is confirmed. In other words, an increase of one unit on tax rate will increase capital structure by 0.01416.

3.3 *The third hypothesis: fixed assets and capital structure*

Based on the results of Table 4, we can observe that there is no meaningful relationship between firms' fixed assets and capital structure when the level of significance is five percent. Therefore, the third hypothesis is rejected and there is no evidence to believe that there is any relationship between fixed assets and capital structure.

3.4 *The fourth hypothesis: firm's size and capital structure*

Based on the results of Table 4, we can observe that there is a meaningful relationship between firms' size and capital structure when the level of significance is five percent. However, the negative sign of t-student implies that the relationship is not positive. Therefore, the fourth hypothesis is rejected and there is a negative relationship between firm's size and capital structure.

3.5 *The fifth hypothesis: operating risk and capital structure*

Based on the results of Table 4, we can observe that there is no meaningful relationship between firms' operating risk and capital structure when the level of significance is five percent. Therefore, the fifth hypothesis is rejected and there is no evidence to believe that there is any relationship between operating risk and capital structure.

3.6 *The sixth hypothesis: firm's profitability and capital structure*

Based on the results of Table 4, we can observe that there is a meaningful relationship between firms' size and capital structure when the level of significance is five percent. The negative sign of t-student means that the relationship is consistent with what we expected. Therefore, the sixth hypothesis is confirmed and we conclude that there is a negative relationship between firm's profitability and capital structure.

3.7 *The seventh hypothesis: the effects of sector on capital structure*

The last issue is associated with the effects of industry on capital structure and we use analysis of variance to investigate this issue among 18 different industries. The null hypothesis of this survey is as follows,

$H_0: \mu_1 = \mu_2 = \mu_3 = \dots = \mu_{18}$

H_1 : At least two sectors of industry have different mean in profitability.

Table 6 shows details of our ANOVA test.

Table 6

The results of ANOVA test

TDR	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.600	17	.035	1.401	.128
Within Groups	21.095	838	.025		
Total	21.694	855			

Based on the results of Table 6, F-value is not statistically meaningful when the level of significance is five or even ten percent. Therefore, we can conclude that there is no significance difference between the mean of profitability among various sectors of industry.

4. Conclusion

In this paper, we have presented an empirical investigation to study the impact of seven factors on capital structure using the panel data gathered from Tehran Stock Exchange over the period of 2004-2011. The proposed study has used regression analysis and found that there was a positive relationship between tax rate and firm's growth rate, and capital structure. The result of the survey also has indicated that there was a negative relationship between firm's profitability and capital structure. However, there was no evidence to believe that there was any relationship between fixed assets and capital structure. We have also concluded that there was a negative relationship between firm's profitability and capital structure but the results of our survey did not indicate that there was any difference between the mean of profitability in various sectors.

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