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The choice between equity and debt: empirical evidence from the Iranian companies

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Abstract The paper efforts to analyze the determinants and their relationship with the capital structure of the listed companies according to the trade-off (TOT) and pecking order (POT) theories. The investigation has used panel data of five variables from Iranian listed companies for a period of ten years. The data consists of 1230 observations regarding stock market and accounting data covering the period from 2001-2010. The inferences are drawn using trade-off theory and Pecking order theory. OLS and GMM analysis is applied for hypothesis testing to determine the influence of the predictor variable. The variables of tax, profit, size, growth and capital intensity factors are included to represent the potential influence of traditional theories. The study analyzes the impact of the financial factors on the debt and equity structure of the Iranian firms. The results indicate that the size, tax and capital intensity are positively related to the capital structure. In addition, profitability is negatively related to the capital structure. However, growth is insignificant. The results of the firm size, tax and capital intensity are consistent with the trade-off theory and the result of the profitability is consistent with the pecking order theory.

Keyword: Capital Structure, Trade-Off Theory, Pecking Order Theory, Capital Intensity.

1 Introduction

The firm to finance its assets can choose a mix of financing options so generally value can be maximized and this is known as the capital structure of the firm. The capital structure indicates how a corporation makes its resource arrangement to finance its assets through equity, debt or a combination of both. Varma and Agarwal [1] define the capital structure as the permanent financing of the firm represented by its long-term debt and net worth.

According to Brealey *et al*. [2], the capital structure is as one of the seven most important ideas in finance. Ross *et al*. [3] refer to capital structure decision as one of the fundamental issues faced by the finance managers. Cole [4] in a study of small business firms capital structure states it is a decision about the best mix of various sources of capital employed in financing the firms operation and growth. The capital structure is significant because it is the pillar of the organization and is a combination of debt and equity used to finance.

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The financial decision of the capital structure is not only concerned with finding the right kind of finance, but is also concerned with choosing the best overall mixture of these funding options for commencement and running the operations of business. Therefore, the financial decision is considered as to have occupying an important role in financial management to formulate the capital structure of the firms, which affects its overall operations, growth and value.

The consequential work of Modigliani and Miller [5] indicated that the market value of a firm depends on its earning power and also the risk of its underlying assets, but it's not consist of the way it chooses to finance its investments or distribute dividends. A firm can choose debt or equity. The theorem regarding capital structure is complicated, but the basic concept is that under certain assumptions, it is not important whether a firm finances with debt or equity.

While this theory depends on many assumptions, it provides the fundamental theoretical background for further research. After MM a great deal of study has been done on optimal capital structure as well as determinants of the capital structure. Theories emerged which describe the behavior of the firm in choosing the optimal capital structure. These are Static Tradeoff Theory and Pecking Order Theory.

This study brought some novelty by involving institutional factors (i.e. tax, profit, firm size, firm growth and capital intensity) to investigate extensively about how the capital structure effects the Iranian companies in order to provide ample evidence and information. However, studies on the relationship between the capital intensity and the capital structure of the Iranian firms are very sparse. In this study the formula of capital intensity shows that how much money a company will need in order to support a certain level of sales. Then the capital intensity is measured by dividing total assets to total revenue. Thus, this study could be considered a pioneer in detailed examination of the determinants of the capital structure of Iranian firms, as preliminary groundwork for prospective researches.

2. Literature review

Determinants of the capital structure of organizations have been debated extensively and this debate has resulted in differing theories.

Trade-off theory considers some conditions of imperfect market and explains that firms determine their optimal capital structure by finding the balance between benefits of debt and costs of debt. Accordingly, firms select optimal capital structure by comparing the tax benefits of the debt and the costs of bankruptcy, that is to say the disciplinary role of debt and the fact that debt suffers less from informational costs than outside equity. Thus, optimal leverage minimizes cost of capital and maximizes firm value [6].

Pecking order theory asserts that firms and companies often finance their investments in the order of using retained earnings, debt and then equity due to asymmetric information in different financial funding instruments, such as debt funding versus equity funding and internal funding versus external funding. One of the aspects of the pecking order theory predicts that profitable firms usually prefer internal financing rather than taking up new debts or equity, even though the debt would be cheaper than equity within certain proportions. Fama and Fench [7] found that comparing to non-profitable firms, profitable firms were less levered. On the other hand, because of information asymmetry, large firms tend to accumulate debts so as to support and keep up with the payments of dividends, while small firms tend to have the opposite behavior [8].

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One of the critical questions for companies in need of new finance is whether to increase the amount of their debt and decrease their equity or vice versa [9]. There is insufficient empirical evidence that shows how companies decide between their financing instruments [10]. Different theoretical approaches examine the determinants of capital structure from different perspectives. Myers [11] draws attention to that a universal theory of the debt-equity choice lacks; moreover, there is no reason to expect such theory, since several useful conditional theories help to understand the debt to equity structure chosen by firms.

Literature shows that several researches had been made in various companies all around the world to examine how companies choose their financing instrument. Gaud et al. [12] examined the issue of debt-equity choice in European firms using a sample of more than 5000 over the period 1988–2000. They found that when equity is available, debt financing is not preferred over equity in European firms. Several studies [13] involving 112 and 172 of American companies conducted between 1974 and 1975 to examine how the American companies decide between their financing instruments and the studies found that the small American companies with high price-earnings ratio issued equity.

Literature on the capital structure of Iranian listed companies such as [14, 15, 16] drew on a cross sectional analysis. Shahjahanpour et al. s' study consisted of 70 Iranian corporations for the duration of 2006-2007, while Kimiyagari and Aynali, 78 firms (2001-2005) of Tehran stock exchange listed corporations. Kordestani and Najafi-Omran selected 93 Iranian corporations for the duration of 2002-2006. These studies attempted to determine a set of explanatory factors affecting the choice of the capital structure of Iranian companies.

The relative costs of debt and equity affect the choice of capital structure of firms and companies. In a chosen capital structure, the net balance of relative debt and equity costs [17] could affect the performance and value of firms.

This study is to determine the financial factors underlying capital structure of Iranian non-financial industry listed companies in Tehran Stock Exchange during the years of 2001 to 2010. We investigate the standard firm-specific determinants of the capital structure, like firm size, profitability, growth opportunities, and tax.

3. Dependent variable leverage

Rajan and Zingales [18] have mentioned response variable depends on the objective of the analysis in this study leverage is selected as the explanatory variable. Mallikarjunappa and Goveas [19] provide several definitions of leverage, such as debt-equity ratio, debt-capitalization ratio, total liabilities - total assets. Debt-Equity Ratio (DER) has been used by Chatrath, et al [20] in their analysis because it affects the firm's dependence on debt and equity subsequently its lending and investment. Pandey [21] considers the capital structure as total debt-to-assets or debt to capital employed. This measure is often used in empirical studies. Qian, et al. [22] have used three measures for capital structure: ratio of total debt over capital; ratio of short-term debt to capital; and ratio of long-term debt to capital. In this study debt-to-equity ratio is used to measure leverage where both short-term and long-term borrowings are considered at their book value and not market value.

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4. Independent variables

4.1 Profitability

The profitability of a firm has a predicted negative impact on debt level. A company with high profit has an opportunity and need to lower debt. According to Myers and Majluf [23], firms are supposed to prefer internal financing to external. Accordingly, more profitable companies have a lower need for external financing whereby they have lower leverage. The hypothesis is that there is a negative relationship between the profitability and the capital structure. A bulk of empirical studies found a negative relationship between leverage and profitability (e.g. [18, 24-30]). While Long and Malitz [31], Salawu and Agboola [32] found the positive relationship.

4.2 Size

A firm's size has a predicted positive impact on the debt level. A large-sized company is less likely to become bankrupt, and therefore attracts more debt. The hypothesis is that there is a positive relationship between size and capital structure. Rajan and Zingales [18], Huang and Song [27] and Lim [28] evidenced this positive relationship between company size and the possibility of bankruptcy from their analysis of the international data, concluding that large firms are less likely to become bankrupt. Warner [33] and Ang and McConnel [34] studied the negative relationship between a company's value and the direct bankruptcy costs and found that large firms tend to have less bankruptcy costs.

4.3 Growth

A firm's growth potential has a predicted positive impact on the debt level. A company with fast growth has great potential for revenue growth and, therefore, has high credit-worthiness to take up more debt. The hypothesis is that there is a positive relationship between growth and capital structure. According to Kester [24], a firm experiencing fast growth tends to borrow more than can be internally generated for growth. Lenders are also willing to lend to firms in fast growth. The debt-equity ratio increases with the growth of the firm's sales revenue. According to Myers [35], a higher leveraged company most probably passes up profitable investment opportunities; therefore, firms with high future growth opportunities should use more equity financing. Such financing effectively transfers wealth from stockholders to debt holders [27].

4.4 Tax

According to Modigliani and Miller [36], companies as a result of the tax deductibility, may prefer debt to equity. Hence, the tax rate has a predicted positive impact on debt. A company facing a high effective corporate tax rate has a need for, or will benefit from, taking up more debt to maximize the tax deduction of the debt interest. It is hypothesized that there is a positive relationship between effective corporate tax rate and capital structure [36]. In the context of Western economies, the works of DeAngelo and Masulis [37], Chiarella et al. [38], Bauer [39] and Lim [28] show that tax rate positively affects debt-equity ratio. The benefit of

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tax encourages profitable firms to select for high debt to obtain a tax shield. According to theoretical and empirical study of the capital structure that the tax shield of debt financing cause the firms to use more debt to maximize the value of the firm.

4.5 Capital intensity

The high ratio of a company's capital suggests that the company has to make a significant investment in assets relative to the amount of sales revenue with those assets can produce. The capital intensity of a firm bears predictable positive impact on a debt level. A company having better capital intensity possesses more collateral assets to sell and then service debt, thereby obtaining an opportunity to take up more debt. Therefore, it has been hypothesized that there is a positive relationship between capital intensity and capital structure. Long and Malitz [31], Friend and Lang [25], and Anderson [40] all found that firms having high capital intensity (high ratio of fixed asset to current asset) leans towards getting a high debt-equity ratio.

5. Methodology

5.1 Data

This study used secondary data set that collected from annual reports of 123 listed companies within the period from 2001 to 2010 in Tehran Stock Exchange. This provided the study with availability and quality of data. The data set did not cover any financial institutions because they have different asset and liability structures.

5.2 Methodology

The study used Ordinary Least Squares (OLS) regression and Generalized Method of Moments (GMM) to test the dependent variable with the independent variables, so the result of the study estimates the following regression models.

OLS Equation

$$y_{cp} = \beta_0 + aTXERCJ_{Cp} + bPROF_{Cp} + cSIZE_{Cp} + dGROW_{Cp} + eCI_{Cp} + \varepsilon_{Cp}$$

GMMEquation

$$\Delta y_{cp} = (I - \lambda)y_{cp-1} + aTXERCJ_{Cp} + bPROF_{Cp} + cSIZE_{Cp} + dGROW_{Cp} + eCI_{Cp} + \mu_C + \mu_p + \varepsilon_{Cp}$$

WhereΔy_{cp} is the difference in the capital structure response for company *C* in year *P*, with financial covariates are effective tax rate (TXER), profitability (PROF), size (SIZE), growth (GROW) and capital intensity (CI). The firm-fixed effects μ_C took accounts cross-sectional differences in the firm characteristics. On the other hand, $\mu_p$represents the firm-invariant time-specific effects which are similar across firms at a given point in time but vary across time. The disturbance term denoted as ε_{Cp} was assumed to be serially uncorrelated with mean zero.

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5.3 Hypotheses

In order to investigate the effect of independent variable (i.e. tax, profit, size, growth and capital intensity) on the capital structure, the study used five hypotheses:

H_1: Firm's tax influences positively to debt levels.
H_2: Firm's profit influences negatively to debt levels.
H_3: Firm's size influences positively to debt levels.
H_4: Firm's growth influences positively to debt levels.
H_5: Firm's capital intensity influences positively to debt levels.

Table 1. Summary of expected results

Determinants	Proxy used in this study	Expected relationship
Leverage	Debt/Equity	-
Profitability	Net Profit/Total Asset	Negative
Size	log of Total Assets	Positive
Growth	log of Total Revenue	Negative
Tax	Tax Amount/ profit before tax	Positive
Capital intensity	Total Assets/Total Revenue	Positive

6. Analysis and discussion

To obtain an overview of the nature of data set, descriptive statistics analyses (minimum, maximum, mean, standard deviation) were employed for the dependent and independent variables.

Table 2. Descriptive statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
DE	1230	-1.139	2.520	0.806	0.696	-0.075	2.807
PROF	1230	-0.32	0.62	0.133	0.119	.638	2.022
SIZE	1230	3.46	7.98	5.547	0.636	.416	1.286
GROW	1230	2.44	8.54	5.400	0.691	.399	2.607
Tax	1230	-0.39	0.43	0.119	0.109	-1.062	2.311
CI	1230	0	4.86	1.475	0.779	1.470	2.639

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As seen in Table 2, the highest mean value of size 5.547 whereas the tax has 0.119 the lowest value. The capital intensity has highest standard deviation of 0.779 whereas the tax has the lowest standard deviation of 0.109.

To examine the degree of correlation and bearing of the relationship between the dependent and independent characteristics of capital structure choice, the spearman's correlation is run using EViews.

Table 3. Correlation coefficient analysis

variables	DE	PROF	SIZE	GROW	TAX	CI
DE	1.0000					
PROF	-0.369**	1.000				
SIZE	0.076**	-0.005	1.000			
GROW	-0.026*	0.054	0.674**	1.000		
TAX	0.128**	0.072*	-0.104**	-0.108**	1.000	
CI	0.066*	-0.273**	0.154**	-0.123**	-0.129**	1.000

Correlation is significant at the 0.01 level **
Correlation is significant at the 0.05 level *

Table 3 indicates that the correlation coefficients among debt to equity and all the independent variables are significant. Debt to equity has a positive significant relationship with the size (r = 0.0756), tax (r = 0.128) and capital intensity (r = 0.066), respectively. This means that firms which high in size and with high tax and high capital intensity tend to have more debt. In addition, debt to equity is significantly and negatively related to the relevance of profitability (r = -0.3690) and growth (r = 0.0256). This indicates that firms with high profitability and growth have low debt level.

Table 4. OLS analysis

OLS		
Variable	**Coefficient**	**Prob.**
Intercept	0.626169	0.0003**
TAXR	0.982338	0.0000**
PROF	-2.284049	0.0000**
SIZE	0.192587	0.0000**
GROW	-0.114786	0.0022*
CI	0.055093	0.0329*
Adj.R2	0.172461	
R2	0.175827	
F-Value (Sig. F)	52.232	0.000
N = 1230 (number of observations) ** are significant at p < 0.01 and *are significant at p < 0.05		

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According to Table 4, the findings of pooled sample ordinary least squares Test, the F statistic was highly significant ($F = 52.23$, $p < 0.000$), indicating that financial variables could be considered to be influencing capital structure. The adjusted R^2 is 0.172 which indicating that the variables in the model explained only 17.24% of the variation in capital structure. This shows that all the independent variables are moderately related to DE without taking residuals into consideration.

Table 5. GMM analysis

GMM		
Variables	**Coefficient**	**p-value**
$DE_{(t-1)}$	0.249	0.000**
TAXR	0.183	0.037*
PROF	-0.405	0.023*
SIZE	0.193	0.000**
GROW	-0.025	0.226
CI	0.064	0.009**
AR (1) test	0.007	
AR (2) test	0.995	
Sargan test	0.147	
N = 984 (number of observations) ** are significant at $p < 0.01$ and *are significant at $p < 0.05$		

Table 5 presents the influences of independent variables on debt equity ratio. Tests for serial correlation in the first differenced residuals, denoted as AR1 and AR2, and Sargan test are reported in the tables of results. The result on AR1 shows that p-value is significant and AR2 is insignificant. According to Table 5, the findings of AR1 (0.007), AR2 (0.995) and Sargen test (0.147) indicating results are satisfactory, suggesting the instruments used in estimating the panel dynamic data model are appropriate.

Based on tables 4 and 5, the tax is positively influencing the debt to equity. The findings of this study support a number of studies (e.g., DeAngelo and Masulis, [37]; Chiarella, [38]; Bauer, [39]; Kimiyagari and Aynali, [15]; Lim, [28]; Mahdavi et al., [41]). The finding has signified that firms with high level of corporate taxes may be required to have more debts in order to acquire tax benefits.

Profitability is negatively related on capital structure which is significant at 5% confidence level. This result is supported by studies on the Iranian context (e.g., Lim, [28]; Qayyum, [29]; Awan et al. [42]; Cortez, [30]). Companies with high profitability do not usually seek for debt financing, whereas companies with low profitability are prone to increase debt level. Because of higher profitability, firms may prefer to keep their profits in the company as an internal funding source. The behavior of firms in Tehran Stock Exchange is following the Pecking Order Theory.

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Firm size is positively influencing the debt to equity and is consistent with trade off theory with a coefficient value of 0.193 which is significant. Kordestani and Najafi-Omran [16], Afza and Hussain [43] and Mitton [44] found the positive relationship. A large-sized firm tends to be diversified in its business and has a greater separation of ownership from management, thus more debt is preferred. Afza and Hussain [43] suggested that the firms which are large in size and having good assets structure should go for debt financing to finance new projects. Growth is insignificant to the capital structure as p-value is more than 0.05.

The results of this study display the capital intensity is positively related to the capital structure. Thus, accepting the Hypotheses H_5 (i.e. capital intensity positively influences on capital structure). Findings of Long and Malitz [31], Anderson [40] and lee et al. [45], support the findings relevant to the firm capital structure and capital intensity. Therefore, a company having better capital intensity possesses more collateral assets to sell and to service debt, thereby obtaining an opportunity to take up more debt.

7. Conclusion

The two main theories (trade-off theory and pecking order theory) which affect either positively or negatively to the determinants of capital structure of the firm. The trade-off theory explains between benefits of tax shield and the cost of bankruptcy. In addition, pecking order theory which explains that profitable firms usually prefer internal financing. The conduct of firms in Tehran Stock Exchange shows that a large-sized company is less likely to become bankrupt, and therefore attracts more debt, supporting the static trade off theory. Profitability variable is negatively related to debt to equity and is consistent with the results of previous researches. The firms with higher profitability prefer equity financing than debt financing in the business and the result is significant, supporting the pecking order theory. Tax is positively influencing the debt to equity and is consistent with Static Trade off Theory. It shows that an increase in tax will cause an increase in debts. The capital intensity has a predicted positive impact on debt level, thus, leading to a negative relationship between risk and capital structure. Thus, the result of this study indicates that the capital intensity is positively influencing the debt to equity and is consistent with Static Trade off Theory. Concerning the effect of capital intensity on financial distress, the literature provides inconclusive findings. An alleviating effect (such as financial distress due to capital intensity) may occur because the capital intensity reduces the level of operating costs by committing a great portion of expenditures to assets (Barton, [46]; Lubatkin and Chatterjee, [47]).

In summary, this paper extends our understanding of the trade-off theory and pecking order theory in capital structure in explaining the financing choice of Iranian listed companies on Tehran Stock Exchange. The findings of this study generally suggest that financial factors are an important determinant of Tehran Stock Exchange's capital structure. It is, however, important for future research to also consider the financial issue in explaining the capital structure of Tehran Stock Exchange in order to better appreciate the relationship.

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