GLOBAL JOURNAL OF ADVANCED RESEARCH
(Scholarly Peer Review Publishing System)

Evaluating the Relationship between the Structures and Past Information with Capital Structure

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ABSTRACT

This study evaluates the relationship between the structure and past information with capital structure between the listed corporations on Tehran stock exchange. To do the study, a sample of 114 corporations from ones listed on exchange was selected by using the stratified random sampling. The study was done during 2007-2012 that 324 observations were totally used to research period. The statistical method Panel data regression was used in this study. For the purpose of study four hypotheses were proposed that all of them were approved. The results show that there is a direct relationship between profitability, book-to-market ratio, corporation size and the ratio of collateral assets with capital structure. It means that capital structure will be increased by increasing independent variables and vice versa.

Keywords: Profitability, Corporation size, Book-to-market ratio, Capital structure.

1.   INTRODUCTION

Financing and investment decisions in corporations are providently taken. In financing decisions, the corporation currently takes its considered funds to be able to fulfill its obligations towards the sponsors in the future; and cost of corporation's capital plays the main role in investment decisions while it is a function of its capital structure. Capital structure presents two competing models for financing decisions in corporations. These models include the parallel and preferential models. In parallel model, corporations identify optimal leverage by making balance between benefits and costs of debts but in preferential model corporations firstly do financing with retained earnings then debts, and finally shares. So different methods can be used to select capital structure that can be included factors derived from the corporation and ones resulted from the market. Due to the effect of different factors of corporation environment that overshadows the decisions of capital structure, and more importantly, as in most cases the effect of these factors and predicting them is extremely difficult, it has been caused to present this subject as the problem of the study. Minimizing financing cost and consequently increasing the corporation's stock market value is presented as a main issue in the section of review of literature of this study. Factors influencing attitudes of financial managers in relation to the sources

and uses of funds, why and how a particular source is selected according to the requirements of the external environment and also dominant phenomena and the internal characteristics are determined.

So the question that is proposed in this relation is this:
What is the relationship between the past information including profitability, corporation size, the ratio of M/B, and collateral assets and the dependent variable financial leverage?

2.   Review of the Literature

Ouzgar et al., (2013), has dealt with investigating the corporations' performance in attracting investment during the recession according to the flexibility of corporations. These findings suggest that financial flexibility is an important factor in attracting capital and investment during the recession. Also some evidences have been found that show the ratio of financial leverage is one of the important components of financial flexibility. Also the results showed that the corporations with less financial flexibility are more vulnerable when cash flow is unexpectedly coming down.   Clark (2012) deals with studying the effect of financial flexibility on the decisions of capital structure. He uses American corporations' data from 1996 to 2008. The results show that when the marginal value of flexibility is reviewed in association with capital structure decisions other variables that affect the capital structure lose their importance a lot, in other words flexibility is the most important factor affecting the capital structure. Clark also suggests that corporations with a higher marginal value of flexibility tend to store their debt capacity for next years; this result is consistent with the study results of De Angelo and Wited (2010). Also corporations that had a higher marginal value of flexibility were more likely to increase capital than to provide their required resources through dissemination of debt that this type of financing had been simply applied to preserve debt capacity. Triyantis and Gamba (2011) measured the value of flexibility; they showed that the flexibility value depends on the cost of external financing, corporation tax rate, the opportunity cost of holding cash, potential growth opportunities for the corporation, and taking capital again. They showed that corporations engaging in financial difficulties must borrow and lend simultaneously. Bayan (2010) investigates the relationship between financial flexibility, leverage and corporation size. He showed that small corporations have lower leverage ratio. Small corporations maintain their debt and leverage ratio at a low level to preserve the flexibility of the corporation. Debt contracts often contain restrictive conditions for investment and debt ratios that can lead to serious complications especially for small and developing corporations. In addition, in contrast to some studies there is an inverse relationship between financial leverage and flexibility. Sandromayerz (2008) dealt with the empirical test and investigation of predicting both Static Trade-off and preferential theories on 157 American corporations during 1989-2007. Finally, the results suggested more certainty in preferential theory than Static Trade-off. Addg (2007) examined a cross sectional test of preferential theory opposed to the Static Trade-off theory in cases including 608 listed corporations on the stock exchange in London during 2000-2006. The results showed that the variables of Static Trade-off theory such as tax breaks, expected growth, size and collateral assets are effective to reason the sectional fluctuations in disseminating new debt as preferential theory is effective too. When combined with the preferential theory, Static Trade-off theory gets the considerable reasoning ability due to the effect of some variables such as the expected growth and size that have been ignored in preferential theory. Also there was a positive significant relationship between these two variables by disseminating debt. Gad, Johnny, Hoosly, and Bender (2007) dealt with investigating the capital structure of 106 corporations listed on the stock exchange in Switzerland during 1995-2001. The results showed that both preferential and Static Trade-off theory play the main role in explaining the capital structure pattern of Switzerland corporations. Derabtz and Fix (2005) examined the determinants of capital structure in Switzerland. The results of the study showed that corporations with more investment opportunities taken less leverage according to both theories. According to the preferential theory but unlike the Static Trade-off theory, profitable corporations and corporations with high liquidity take less leverage. Chen and Hammes (2004) examined the capital structure, theories, and experimental results on seven countries such as Canada, Denmark, Germany, Italy, Sweden, Britain and the united states. They showed that there is a direct relationship between the size and tangible assets of corporation and leverage; and there is an inverse relationship between profitability and leverage. The obtained results are consistent with conventional theories of capital structure like

preferential and Static Trade-off theory. David Allen (2000) examined the capital structure of 48 corporations listed on the Australian stock exchange. The obtained results were consistent with the preferential theory based on considering financing resources and maintaining the appropriate capacity of debt but they didn't support the prediction of Static Trade-off theory. Jensen and Mc Ling (1998) examined the managing behavior, agency costs, and ownership structure. They studied the reasons of selecting capital structure pattern from the perspective of agency theory and implicitly dealt with explaining "Static Trade-off theory". Based on this study, it can be possible to achieve an optimal ownership structure by creating a parallel between the benefits of debt and agency costs of debt. Mighani (2014) examined the relationship between financial flexibility and capital structure decisions. In this study, data related to 94 Iranian corporations were tested during 2005-2011. He showed that the marginal value of cash was positive in Farklando Wang method but it was not significant in Clarke method. The results of the second hypothesis suggest that there is a significantly inverse relationship between financial flexibility and debt ratio. Also, the results of the third hypothesis states that the marginal value of cash has the most impact on the capital structure decisions. Pourheidari (2012) examined the relationship between industry, size, profitability and collateral assets, and financial leverage of corporation. He showed that there was a significantly inverse relationship between the financial leverage and profitability and the relationship between the financial leverage and size was significant and direct. Based on this study, no significant relationship was seen between industry and collateral assets and financial leverage. Marmarchi (2010) examined the factors affecting the capital structure and financial leverage ratios in industrial corporations listed in Tehran stock exchange. He indicated that growth opportunities, corporation size and power of managers have a positive effect on financial leverage and past profitability has a strong negative effect on financial leverage. Also the corporation power to give collateral and its interest fluctuations has a positive effect on the financial leverage in long-term and it has a negative effect in short-term. Bagherzadeh (2008) examined the pattern of capital structure of listed corporations in Tehran stock exchange. He studied 158 manufacturing corporations and found that the there is a positive relationship between profit and the corporation's tangible fixed assets and the corporation size with debt ratio. The findings of this study reject the preferential theory and support the Static Trade-off theory.

3.   Research Hypothesis

The main hypothesis: there is a relationship between the structures and past information with capital structure.

Sub-hypotheses:

1. There is a relationship between profitability and capital structure.

2. There is a relationship between M/B and capital structure.

3. There is a relationship between the size of corporation and capital structure.

4. There is a relationship between the ratio of collateral assets and capital structure.

4.   Methodology:

Regarding that models, methods, and available theories were used in this study to solve the problem or to improve condition, it is practical in terms of purpose. Considering that a random sampling has been used to collect data, inference method is descriptive in explaining sample observations and it is analytical in generalizing to population. So a descriptive-analytical method has been used. Finally, considering that the original data in fieldwork has been obtained based on past performance and historical data contained in the financial statements have been achieved, the research design is *Ex-Post Facto*.

A   Sample and Sampling

In this study the comparable manufacturing corporations listed in Tehran stock exchange were described as 114 corporations. Stratified random sampling method was used to sampling. To determine the sample size, firstly the random sample with size 15 was selected as pilot and based on its obtained variance the random sampling size of 54 corporations was measured by using the following formula:

$$S^2 = \left[\frac{\sum(x_i - \overline{x})^2}{n - 1} \right]$$

$$n \geq \frac{t^2(\frac{\alpha}{2}, df)s^2}{D^2}$$

$$= \frac{2.5706^2 * 0.08154}{0.01} = \frac{53.8815}{}$$

B   Methods and Tools for Data Analysis:

In this research, software, **statistical and non-**statistical **methods for the analysis of data** were used:

1) **Descriptive Methods:** mean statistical index, standard deviation, skew and **kurtosis index** were used to describe data.

2) **Normality Test of Distributing Variables:** Kolmogorov - Smirnov (KS) Test was used to assess the normality of distributing variables.

In this study, if the significance level is greater than 0.05, it has been considered as the normality of distributing variables.

3) **Normality of Residuals**: Durbin-Watson Test was used to determine the independence of the estimated model errors. If the test statistic is usually from 1.5 to 2.5 indicates that the estimated model errors are not autocorrelated.

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4) Test of Evaluating that Model's Effects are fixed or Variable: evaluating that model's effects are fixed or variable was done based on F Leamer test. If the significance level is greater than 0/05 in this study, the integration method is used and if the significance level is less than 0/05, the painting method is used to estimate the model.

5) **Randomness Test** of the Estimated **Model Errors**: Hausman test was done to estimate the randomness of regression model errors. If the null hypothesis is accepted, the fixed effect model is used otherwise the random effect model is used.

6) **Evaluation of Linear Independence of the Independent Variables:** with regard to the need to establish an additivity presupposition in the compound linear analysis, the linear correlation analysis based on the Pearson correlation coefficient criteria was used to determine the linear independence of the independent variables.

7) Determining the Relationships between Variables: in order to determine the relationship between independent and dependent variables, the compound linear regression with panel data approach was used.

In other words, based on historical data related to the dependent and independent variables during 5 year parameters of the linear relationship between variables were estimated.

8) Validation of the Estimated Correlation: the coefficient of determination or R2 was used for this purpose. In this assessment, if the estimated value of the coefficient is closer to one or hundred percent, more percentage of the actual changes is related to the actual and independent variables that are expressed based on the estimated relationship, also there is a strong linear relationship between the variables.

9) Generalized Methods: Student's t-test was used to evaluate the possibility of generalizing the relationship between every independent variable with dependent variable or the significance of the estimated linear gradient. In addition, Fisher test was used to evaluate the significance of the estimated linear relationship.

C) Research Model:

In this study, the total relationship between the variables is defined as follows:

Y=f(x$_1$, x$_2$, x$_3$, x$_4$)

In this equation: Y or BL is dependent variable of capital structure, X1 or BEP is profit, X2 or M / B is book-to-stock market ratio, X3 or size of corporation, X4 or IGP is collateral assets.

Variables are measured as follows:

1) Financial Leverage: this variable defined as the dependent variable was calculated from the following equation:

$$BL_{i,t} = \frac{BD_{i,t}}{TA_{i,t}}$$

Where BL I, t is the financial leverage based on book for corporation i at time t. BD I, t is book value of debt for corporation i at time t. TA I, t is total assets for corporation i at time t, respectively.

2) Profitability: this variable defined as one of the independent variables was calculated from the following equation:

$$BEP_{i,t} = \frac{EBIT_{i,t}}{TA_{i,t}}$$

Where: $\textbf{EBIT}_{i,t}$ is earnings before interest deduction and tax for corporation i at time t. TA I, t is total assets for corporation i at time t, respectively.

3) Book-to-Market Ratio: this variable is defined as one of the independent variables and was calculated from the following equation:

$$\frac{M}{B}_{i,t} = \frac{BD_{i,t} + ME_{i,t}}{TA_{i,t}}$$

Where BD I, t is book value of debt for corporation i at time t and ME I, t is market value of equity for corporation i at time t and TAI, t is total assets for corporation i at time t, respectively.   **4) Size of Corporation:** it is determined as one of the other independent variables based on the corporation sale logarithm or *Size= lns.*

5) Collateral Assets: this variable defined as one of the other independent variables that were calculated from the following equation:

$$IGP_{i,t} = \frac{IgP_{i,t}}{TA_{i,t}}$$

Where Ig p I, t is the fixed tangible asset of corporation i at time t. TA I, t is total assets for corporation i at time t.In this study, the relationship between variables has been defined in a parametric linear equation:

$$BL = \propto + \beta_1 BEP + \beta_2 \left(\frac{M}{B}\right) + \beta_3 Size + \beta_4 IGP + \varepsilon.$$

That the values of independent and dependent variables were determined based on historical data relating to the performance of corporations in the random sample and parameters of this equation including α, β_2, β_3 and β_4 were evaluated by using compound linear regression. Besides, the research model is depicted graphically in Figure 1:
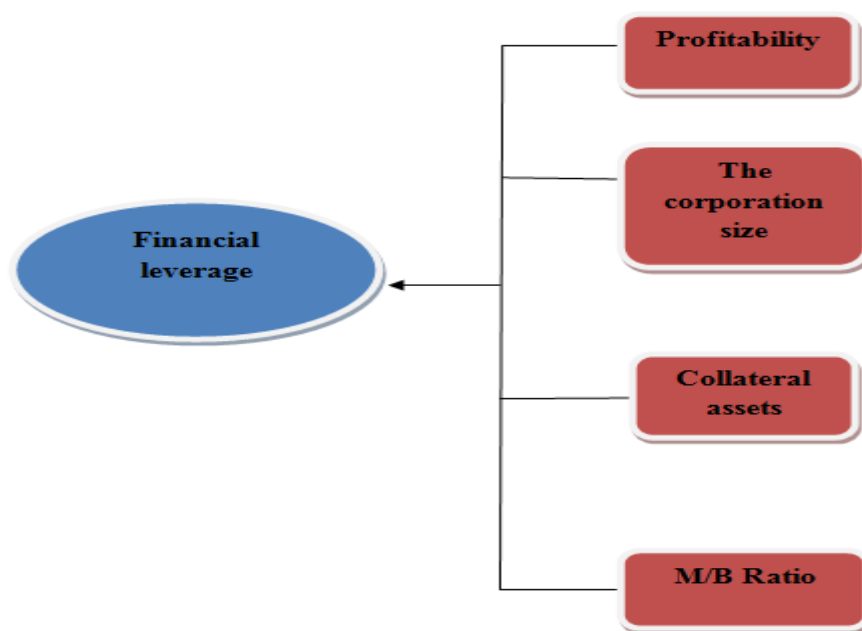
Figure 1: Conceptual model of research

D) Software:

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In this research, SPSS and EVIEWS were used for data analysis and statistical calculations and EXCELL software was used for initial processing of data and sorting them. Moreover, Rahavard-e novin software was applied to use stock data and information.

5.   Findings of the Study:

In this section, the findings' description was firstly presented and after proposing the presuppositions of compound linear regression the results related to analyzing relationships between the variables were presented.

A) Describing Findings:
The results of describing findings were summarized in the form of evaluating the statistical indexes of variables in table (1).

Table (1) Description of Findings

	Dependent variable	Independent variables			
Abbreviated form	BL	BEP	M/B	SIZE	IGP
Title	Financial leverage	Profitability	Book-to-market ratio	Corporation size	The ratio of collateral assets
Mean	0.75604	0.18975	0.170737	5.44269	0.29742
Median	0.67083	0.17371	0.08604	5.32525	0.26087
Maximum	6.397	0.54	0.709717	8.381	5.736
Minimum	0.076	0.001	0.226728	4.044	0.003
Standard deviation	0.75873	0.11653	0.293533	0.67884	0.417078
Skew	6.71	-0.682	0.625454	0.909	10.719
Kurtosis	1.880315	-0.077	2.498459	1.702	1.458951

Skew shows the asymmetry of distribution with respect to a given index (usually towards mean). If the coefficient of skew is negative, the skew is to the left. In the above table it can be seen that except the corporation's profit variable that the skew is to the left in other variables the skew is to the right. Kurtosis of all variables except the profit variable is higher than the normal distribution (because their kurtosis coefficient is positive). Financial leverage variable has the maximum 6.397, the minimum 0.076, with the median 0.75604, and standard deviation 0.75873.

Profitability variable has the maximum and minimum 0.54 and 0.001and the median 0.18975 with standard deviation 0.11653 and other information that can be seen in the above table.

B) Analysis of Presuppositions:

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With regard to the use of compound linear regression to estimate the relationships between variables in this section, presuppositions of using this method have been assessed.

    1) Investigating the Normality of Variables: to do regression analysis, the normality test of variables is firstly examined by K-S test. In this test, the null hypothesis or the statistical assumption is the normality of variables' distribution. This test was done to all dependent and independent variables and its results were summarized in table (2):

Table (2) Kolmogorov - Smirnov (KS) Test

	Dependent variable	Independent variables			
Abbreviated form	**BL**	**BEP**	**M/B**	**SIZE**	**IGP**
Title	**Financial leverage**	**Profitability**	**Book-to-market ratio**	**Corporation size**	**The ratio of collateral assets**
The number of samples	324	324	324	324	324
Mean	0.75604	0.1898	0.17084	5.44269	0.29742
Standard deviation	0.75873	0.1165	0.293533	0.67884	0.417078
The maximum absolute deviation	0.406	0.075	0.498	0.116	0.244
The maximum positive deviation	0.406	0.075	0.498	0.116	0.194
The maximum negative deviation	-0.273	-0.054	-0.475	-0.063	-0.244
The Z score	5.886	1.092	11.436	1.677	3.534
Significant level	0	0.184	0	0.007	0

    According to Table (2), as the significance level in variables is lower than 0.05 except for profitability and corporation size variables, H0 hypothesis is rejected and H1 accepted. In other words, other data are not normally distributed. To normalize variables, square logarithm was used and normality test was repeated again. Based on significance level, normally distributed variables re-test was accepted at the level of five percent.

2) Reliability Test of Variables: Fisher ADF test was used to evaluate the reliability of the variables in the regression estimation. The results of this evaluation are presented in Table (3):

Table (3) Fisher ADF Test

Type of variable	Title	Abbreviated form	Probability	Score
Dependent variable	**Financial leverage**	**LNBL**	**0**	82.9125
Independent variables	**Profitability**	**BEP**	**0**	195.305
	Book -to-market ratio	**LNM/B**	**0**	653.065
	Corporation size	**SIZE**	**0**	130.856
	The ratio of collateral assets	**LNIGP**	**0**	56.656

As it can be seen in all dependent, independent, and adjusted variables, the P-Value is less than   0.05 in unit root tests and it indicates that the variables are reliable. This means that the mean and the variance of variables and their covariance had been constant over time and during different   years, respectively. So using these variables in model does not create false regression.

3) Durbin-Watson Test:

Durbin-Watson test was used to investigate the normality of residuals.

Table (4) Models' Durbin-Watson Coefficients

Model	1	2	3	4
Durbin-Watson coefficient	1.83025	2.39563	1.692019	2.12680

According to Table (4) since the calculated Durbin-Watson for all variables is from 1.5 to 2.5 thus there is no autocorrelation in the model. In other words, since the value of Durbin-Watson is from 1.5 to 2.5 for all variables the assumption of lack of correlation between the errors is not rejected and regression can be used.

4) Coefficient of Determination Test (R^2-test):

Coefficient of determination and the adjusted coefficient of determination were used to investigate the relationship between the variables. Results show the following cases.

Table (5) Models' Coefficient of Determination and the Adjusted Coefficient

5.3 Model	5.2 Coefficient of determination (R^2)	5.1 Adjusted coefficient of determination (adjusted R^2)

5.4	1	0.775	0.774
5.5	2	0.930	0.928
5.6	3	0.804	0.801
5.7	4	0.568	0.532

The coefficient of determination shows the explanatory power of the independent variables.   Table (5) shows that how much variation in the dependent variable is expressed by   the independent variable. For example, in model (1) the independent variable is able to explain   the variations of the dependent variable about %77/5.

D) Determining the Relationships between Variables:

With regard to the establishment of the evaluated presuppositions in the previous section, in this section the relationships between the variables were examined by using the compound regression method.

1) Determining the Relationship between Profitability and Financial Leverage: the results of this relationship have been described in Table (6) by using the compound linear regression: **Table (6) Regression Evaluation of the Relationship between Profitability and Financial Leverage**

$BL_{it} = .722 + .681 * BEP_{it}$				
Variables	**The estimated coefficient**	**Standard error**	**T-test statistic**	**T-test probability**
Profitability	0.681	0.228	10.35370	0.0000
Constant value	722.0	045.0	2.401554	0.0000
R^2	0.775	**Adjusted R^2**		0.774
Durbin-Watson criteria	2.12680			

1. Based on the table, interception and the slope of variable are 0.722 that by replacing in the related linear equation the relationship between profitability and financial leverage is as follows:

$$BL_{it} = .722 + .681 * BEP_{it}$$

2. The above equation shows a direct relationship between profitability and financial leverage.

3. The coefficient of determination (R^2) shows the explanatory power of the independent variables that are able to explain the variability of the dependent variable about %77.5.

4. Because Durbin-Watson value is from 1.5 to 2.5 so there is no autocorrelation in model.

5. Probability of F shows that the model is statistically significant (because the probability of F is less than 0.05). So the first hypothesis is confirmed with 95% confidence .It means there is a relationship between profitability and financial leverage.

2) Determining the Relationship between the Ratio of Collateral Assets and Financial Leverage: The results of this relationship have been summarized by using the compound linear regression in Table (7):

Table (7) The estimated regression of the relationship between book-to market ratio and financial leverage

$BL_{it} = .612 + .030 * M/B_{it}$				
Variables	**The estimated coefficient**	**Standard error**	**T-test statistic**	**T-test probability**
Bok-to-market ratio	0.030	0.019	4.54850	0.0000
Constant value	0.612	0.144	8.61160	0.0000
R^2	0.930	**Adjusted R^2**		0.928
Durbin-Watson criteria	1.692019			

1. Based on the table, interception and the slope of variable are 0.612 that by replacing in the related linear equation the relationship between profitability and financial leverage is as follows:

$$BL_{it} = .612 + .030 M/B_{it}$$

2. The above equation shows a direct relationship between profitability and financial leverage. 3. The coefficient of determination (R^2) shows the explanatory power of the independent variables that are able to explain the variability of the dependent variable about %93.   4. Because Durbin-Watson value is from 1.5 to 2.5 so there is no autocorrelation in model.   5. Probability of F shows that the model is statistically significant (because the probability of F is less than 0.05).So the second hypothesis is confirmed with 95% confidence .It means there is a relationship between book-to-market ratio and financial leverage.

3. Determining the relationship between corporation size and financial leverage: the results of this relationship have been summarized by using the compound linear regression in Table (8):   **Table (8) The estimated regression of the relationship between corporation size and financial leverage**

$BL_{it} = .821 + .011 * SIZE_{it}$				
Variables	**The estimated coefficient**	**Standard error**	**T-test statistic**	**T-test probability**
Corporation size	0.011	0.016	4.242	0.0000
Constant value	0.821	0.0197	1.558	0.0000
R^2	0.804	**Adjusted R^2**		0.801
Durbin-Watson criteria	2.39563			

1. Based on the table, interception and the slope of variable are 0.821 that by replacing in the related linear equation the relationship between profitability and financial leverage is as follows:

$$BL_{it} .821 + .011 SIZE_{it}$$

2. The above equation shows a direct relationship between profitability and financial leverage. 3. The coefficient of determination (R^2) shows the explanatory power of the independent variables that are able to explain the variability of the dependent variable about %80.4.   4. Because Durbin-Watson value is from 1.5 to 2.5 so there is no autocorrelation in model.   5. Probability of F shows that the model is statistically significant (because the probability of F is less than 0.05). So the third hypothesis is confirmed with 95% confidence .It means there is a relationship between Corporation size and financial leverage.

4. **Determining the Relationship between the Ratio of Collateral Assets and Financial Leverage:** the results of this relationship have been summarized by using the compound linear regression in Table (9):

Table (9) The estimated regression of the relationship between the ratio of collateral assets and financial leverage

$BL_{it} = .610 + .953 * IGP_{it}$				
Variables	**The estimated coefficient**	**Standard error**	**T-test statistic**	**T-test probability**
The ratio of collateral assets	0.956	0.903	14.86	0.0000
Constant value	0.956	0.903	14.86	0.0000
R^2	0.568	**Adjusted R^2**		0.532
Durbin-Watson criteria	1.83025			

1. Based on the table, interception and the slope of variable are 0.610 that by replacing in the related linear equation the relationship between profitability and financial leverage is as follows:

$$BL_{it} = .610 + .953 IGP_{it}$$

2. The above equation shows a direct relationship between profitability and financial leverage. 3. The coefficient of determination (R^2) shows the explanatory power of the independent variables that are able to explain the variability of the dependent variable about %56.8.   4. Because Durbin-Watson value is from 1.5 to 2.5 so there is no autocorrelation in model.   5. Probability of F shows that the model is statistically significant (because the probability of F is less than 0.05). So the fourth hypothesis is confirmed with 95% confidence .It means there is a relationship between the ratio of collateral assets and financial leverage.

6.   Conclusion

In this study the relationships between variables were assessed using compound linear regression that the results briefly showed that:

1. There is a significant relationship between profitability and financial leverage. This direct relationship has been assessed by the estimated coefficient. The coefficient of determination (R^2) showed that %77.5 of the variations of variables have been expressed by the estimated relationship that shows a strong linear relationship between variables.

2. There is a significant relationship between book-to-market ratio and financial leverage. Considering the estimated coefficient this relationship is direct. The coefficient of determination showed that %93 of the variations of variables has been expressed by the estimated relationship that shows a strong linear relationship between variables.

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3. There is a significant relationship between corporation size and financial leverage. Considering the estimated coefficient this relationship is direct. The coefficient of determination showed that %80.4 of the variations of variables has been expressed by the estimated relationship that shows a strong linear relationship between variables.

4. There is a significant relationship between the ratio of collateral assets and financial leverage. Considering the estimated coefficient this relationship is direct. The coefficient of determination showed that %56.8 of the variations of variables has been expressed by the estimated relationship that shows a strong linear relationship between variables.

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