

# Determinants of Corporate Capital Structure: A Theoretical Integration and Some Empirical Evidences

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## Abstract

This research reviews all of the relevant important theories and concepts developed in corporate capital structure until till date in an aggregate manner. The empirical part of the study reveals that the leverage ratios defined in short-term debts, long-term debts, total debts and book value of assets are correlated. Similarly, the leverage ratios defined in short-term debts, long-term debts, total debts and market value of assets are correlated. However, book value based and market value based leverage ratios are not correlated. The leverage ratios defined in earnings before interest and taxes over interest and earnings before interest, taxes and depreciation over interest are positively perfectly correlated. Besides, short-term loans are three times more compare to long term debts, firms are reluctant in paying tax and allotment in research and development expenses are insufficient. In addition, industry median average, non-debts tax shield, uniqueness (R&D) positively significantly affects financial leverage and, and size, tangibility, tax rate, dividend pay-out, agency cost, business risk, GDP growth, and money growth negatively significantly affects financial leverage. The selling, general and administrative expenses positively affects short-term debts, negatively affects long-term debts and have no significant effects on total debts. Last but not least, human capital cost do not have affect on any kind of leverage.

**Keywords:** determinants, financial leverage, book value based leverage, market value based leverage

## 1. Introduction

After the famous works of Modigliani and Miller (1958, 1963), inspired by Durand (1952) and Allen (1954), many theories are developed to explain the capital structure behaviours of the firms. There are some supports for each of the theories. As a result, writing a paper on a part of capital structure is good for a paper but not good for our unified understanding in capital structure because a group of theories conflict with the other group of theories or a concept is not included in the other concept. Realizing the truth, Fama and French (2005) conclude, "it is probably time to stop running empirical horse races between them (trade-off & pecking order theory) as stand-alone stories for capital structure. Perhaps, it is best to regard the two models as stable mates with each having elements of truth that help explain some aspects of financing". Similarly, Barclay and Smith (2005) also assert: Although the pecking order theory is incapable of explaining the full array of financial policy choice, this does not mean that information costs are unimportant in corporate decision making. On the contrary, such costs will influence corporate financing choices and, along with other costs and benefits, must be a part of a unified theory of corporate financial policy. As a result, researchers are looking for common factors affecting capital structures, instead of testing trade-off theory or pecking order theory or other concepts of capital structure since late 1980s.

But the path of looking for common factors, accelerated from 1988 after the classic paper of Titman and Wessels (1988), are not in the right track. All of the studies suffer from serious flaw (s) at least in the variables selection to present factors affecting financial leverage. As in the variable selection, in the research path, valuable knowledge created by an empirical study in terms of the variables, excluded in the later empirical studies and revealed new findings which is a problem for our unified understanding in capital structure. For instance, the variables-industry classification and uniqueness included in the paper of Titman and Wessels (1988) and found significant are not included in the paper of Rajan and Zingles (1995). Consequently, there is no common set of determinants of optimal capital structure. Table 1 shows the limitations of the six papers published in the

esteemed journals.

Table 1. Studies in determinants of corporate capital structure

Author	Technique	Findings	Limitations	Published
Titman and Wessels (1988)	SEM	All factors are insignificant except industry classification	Only industry classification is significant	Journal of Finance
Hariss and Raviv (1991)	Literature Survey	In general, leverage increases in fixed assets, non-debt tax shield, general & administrative expenses, growth and size and decreases with volatility, advertisement, research & development, bankruptcy probability, profitability, and uniqueness.	Methodology, no empirical evidence, not consistent with findings of other studies.	Journal of Finance
Rajan and Zingels (1995)	Regression Analysis	Size, growth, profitability, tangibility are important factors	Methodology, human capital, industry median, expected inflation not included	Journal of Finance
Frank and Goyal (2009)	Econometric Analysis	Six core factors: profitability, growth, size, industry classification, tangibility and inflation	Only USA data, methodology, human capital variable not considered	Financial Management
Matsa (2010)	Regression Analysis	Tangibility, growth, sales, profitability, bankruptcy probability and human capital bargaining variable are significant.	Only USA data, methodology, industry variable, expected inflation variable is not considered	Journal of Finance
Berk et.al (2010)	Theoretical Paper	Moral hazard or information asymmetry not important, human cost of bankruptcy and industry classification are important, debt can be used as a strategic variable to save in wages and salary, capital-intensive firms uses higher leverage.	Not mentioned whether the human capital factor has multicollinearity with other factors. no empirical evidence.	Journal of Finance

Source: Literature Review.

In this paper, all of the theories and concepts are developed in the field capital structure until till date are considered in aggregate manner. Based on the theories and the concepts, up-to-date indicators of the factors affecting capital structure are identified and proposed. The data is analyzed by descriptive statistics, correlation analysis, and ordinary least squares method (OLS). OLS is used as the panel data is poolable.

The broad objective of this study is to determine the determinants of the corporate capital structure. In consistent with the broad objective, the specific objectives are: (i) to consider the important theories and concepts developed until till date in an aggregate manner, (ii) to extract factors from the theories and concepts, (iii) to present the up-to-date indicators for the factors, (iv) to determine the factors affecting the corporate capital structure, (v) to identify the effect of human capital cost on financial leverage, and (vi) to supply the empirical evidences on various issues of the capital structure.

The data is collected on 28 variables based on availability of the required data. 8 variables are selected to present financial leverage and 20 variables are selected to present the determinants of the capital structure. However, the number of independent variables are decreased to 12 by checking multi-co-linearity. Among the financial leverage variables, short term debts is positively strongly related with total debts (0.82). As majority of the financial economists used short-term debts to total assets, long-term debts to total debts and total debts as the measure of financial leverage or capital structure, this study determined the determinants of the financial leverage defined in terms of short-term debts, long-term debts and total debts.

In order to achieve the objectives, this study uses data from 14 pharmaceuticals companies listed at Dhaka Stock Exchange Limited-the main stock exchange of Bangladesh for seven years: 2006-2012. The data is collected from the annual reports of the companies reserved at Bangladesh Securities and Exchange Commission library, Dhaka Stock Exchange Limited library, Chittagong Stock Exchange Limited library and University of Liberal Arts library. The book value based data is used in this study if not indicated otherwise. The Macroeconomic related data is collected from various issues of Bangladesh statistical yearbook and various publications of the central bank of Bangladesh-Bangladesh Bank.

The first section of the thesis is about introduction to the thesis. The second section of the thesis deals with the theories and concepts of capital structure. The third section of the thesis is about the determinants of the capital structure. The fourth section is about the measures of capital structure. The fifth section is about the empirical results. They study ends with concluding remarks.

## 2. Theories of Capital Structure

### 2.1 Trade-Off Theory of Capital Structure Choice

Scott (1976) argued to determine the optimal amount of debt based on the trade-off of the benefits and costs of the debts. The benefits of the debt comes from the cheaper rate of interest compare to cost of equity, the tax deductibility of the interest payments, and the reduction of available cash in the hands of managers which stops misuse of funds and hence reduces agency cost between managers and shareholders (Jensen & Meckling, 1976). On the other hand, the costs come from the agency costs, the financial distress cost, human bankruptcy cost and personal tax (Miller, 1977). When profitable firm increases debt in the capital structure, at the beginning stage, the marginal benefits of the using debts is higher than the marginal costs of the using debts. At a point, the marginal cost of benefits of using debt is equal to the marginal cost of using debts. After the point, the marginal costs of using debts become higher than the marginal benefits of using debts. So, optimal level of debt is determined at the point where marginal costs of using debt is equal to the marginal benefits of using debts. As a result, the important implication of this model is that the corporate firms have optimal debt ratio that maximizes the value of the firm. Figure 1 shows pictorial presentation of static trade off theory.

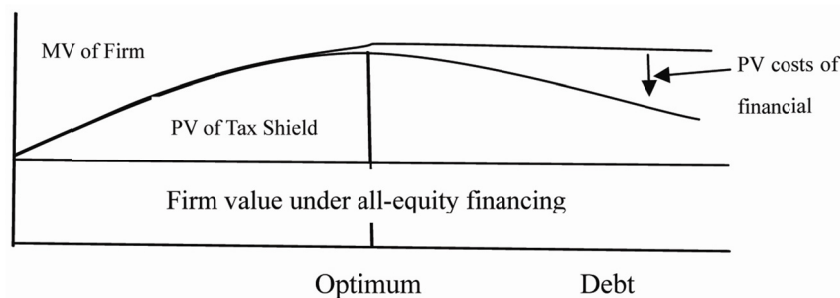


Figure 1. The static trade-off theory of optimal capital structure

### 2.2 Agency Cost Theory of Capital Structure Choice

#### 2.2.1 Agency Cost Theory

Jensen and Mackling (1976), Fama and Jensen (1983) and Fama (1980) argued that agency cost is substantial, and it arises from the conflict of interest between managers and shareholders and the managers and bondholders. The agency costs of debt those may be created by shareholders/managers and reduces firm values are summarized as under: (a) Debt Overhang/Under Investment Problem: Shareholders may give up some positive NPV projects thinking that the value fully be captured by the debts (Myers, 1977). (b) Transfer of Assets/Asset Substitution: Equity holders may take very high risky negative NPV projects. If the projects become successful they get most of it. They look for the upper side and the down side of the projects is left for the bond holders (Jensen & Meckling, 1976; Galai & Masulis, 1976). (c) Short-sighted Investment Value: Instead of looking to firm value, shareholders may be interested for the short-term profit (Grinblatt & Titman, (2001). and (d) Reluctance to Liquidate Problem: Shareholders may be reluctant to liquidate the firm when the liquidation value is more than the ongoing firm value (Grinblatt & Titman, 2001).

As shareholders may take the above selfish strategies, bond holders take measures to mitigate and minimize the problems. They will increase the cost of debt and will not offer debts without debt indenture. However, the above costs can be eliminated by using only equity in the capital structure. But that will increase the agency cost of equity with other disadvantages. The cost of equity can be minimized by using moderate level of debt in the capital structure. Jensen (1986) argued, in his seminal work, free cash flow hypothesis, that using debt require payment of fixed interest, which in turn reduces available cash to the managers and thus reduce the possibility of misuse of the funds and minimize the agency cost of the equity. Furthermore, Grossman and Hart (1988) argued that debt reduces excess perquisite consumption.

### 2.2.2 Employee Bargaining / Human Capital Theory

Sarig (1988) propounded a theory called Employee Bargaining Theory in the area of modern corporate finance. High unionized firms and firms have staff of easily transferable skills should use high debt. In addition, Chang (1992) argued that the firms using more debt pay less as salary and wages. Berk et al. (2010) did not find any evidence that firms will have to bear sizeable bankruptcy costs. They argued that costs of using debt are not generated from moral hazard or information asymmetry rather it is from human cost of bankruptcy. Like Berk et al. (2010), Matsa (2010) showed that debt can be used as a strategic variable in order to save in wages and salary. Consequently, the debt ratio and salary and wages ratio should have negative relationship. Matsa (2010) found significant and negative relationship but Graham and Harvey (2001) did not find any evidence to support the employee bargaining theory and concluded that debt is not used for employee bargaining.

### 2.3 *Asymmetric Information Theory of Capital Structure*

#### 2.3.1 Pecking Order Theory

Myers (1984), Myers and Majluf (1984) argued that capital structure is a matter of preference of financing to the firms. The preference is designed based on two important factors: the information asymmetry and the transaction costs. Because of information asymmetry, investors may think that managers issue equities when it is overpriced. To remove this fear from the investors, in general, the equity prices are under-priced. Consequently, the investors accept this opportunity and grab the most of the positive NPV of the projects. The other important factor that influences the capital structure preference is transaction cost of securities. Transaction costs is zero or very low for the internal funds. But the debt and equity issue are subject to transaction costs. Hence, to avoid these problems, managers should use internal sources of finance first and then the external sources second. According to the theory, managers should use internal funds: retained earnings, provident fund, depreciation fund, deferred payment of dues etc first and, if need, external sources: debt, convertible debt second and equity last. There are three important implications of this theory those are odd with trade of theory: there is no target debt equity ratio, profitable firm use less debt, and firms prefer to maintain financial slack.

#### 2.3.2 Signalling Theory

Signalling theory of Ross (1977) argues that issuing debt or increasing debt in the capital structure conveys positive message about the companies' future performances to the markets. The investors' think that a company would not use the debt if the future earnings would not be enough to pay the interest payments. However, several authors argue that to make the investors foolish, the managers can issue debt. But in reality that may not be the case. Because if the managers take loan when not necessary, they will have to pay the expenses in future. Brander and Lewis (1986) showed that debt conveys positive signal to the capital market about the production policy of the firm. Based on this theory, a positive relationship is expected between the share price and the debt ratio. Graham and Harvey (2001) did not find any evidence to support signalling theory.

#### 2.3.3 Credit Ratings/Supply Side Factors

Flannery (1986) argued that firm borrows short-term, if there is a possibility of improvement in the credit rating of the firm in future. Faulkender and Petersen (2006) explained that rated firms can take more debts than unrated firms as unrated firms have restriction to excess in finance markets. They used rated or not rated dummy variable to measure this variable. Frank and Goyal (2009) argued that high debt rating means less information asymmetry and hence firms can raise capital by issuing equity. Graham and Harvey (2001) finds that in general credit rating is important in debt decision making but not used in making decision between short-term vs long-term. Kishgen (2006) showed that firms near credit rating change-upgrade or down grade issue less debt compare to equity. Besides, Voutsinas and Werner (2011) showed that monetary condition and supply of credit are important in corporate financing decision especially small firms face constraints in recession.

#### 2.3.4 Market Timing Theory of Leverage

The Market Timing Theory (Myers, 1984) explains that managers want to accelerate market value of the firm on the changes of stock prices. They issue stock, when the stock price is high and issue debt when the stock price is low. In the field, Baker and Wurgler (2002), Korajczyk, Lucas, and McDonald (1990), and Loughran and Ritter (1995) found evidence for the market timing theory. Lucas and McDonald (1990) argued that if because of information asymmetry, the stock price is low; equity will be issued after the release of the information. Graham and Harvey (2001) found significant evidence to support Lucas and McDonald (1990). Because of adverse selection problem related with time, a negative relationship between leverage and stock price may exist (Frank & Goyal, 2009). Besides, Myers (1977) argued that higher market to book may be because of expectation of future growth. Present market value of assets is also possible to estimate from the recent stock prices. So, Frank and

Goyal (2009) summarized the effects those can be examined the relationship and stock market are: (i) growth (ii) adverse selection cost (iii) asset price change and (iv) market timing. But, stock price, sometimes, not only gives very misleading information, but also collapse. As a result, it should not be used to find any relationship between leverage and stock. Hence, Welch (2004) argued that previous all variables used to find the relationship between stock market and leverage are wrong. The relationship should be determined based one stock market returns.

#### *2.4 Product Market & Industrial Organization Variables and Capital Structure*

##### *2.4.1 Industry Specific*

Capital market is under substantial product and industry influences. Titman (1984) argues that the firms producing sensitive products uses less debt so that the customers and the suppliers do not become worried about their firms become financially distressed, Bradley et al. (1984) showed that debt ratio is industry specific and industry classification can explain 54 per cent of the variation in the debt ratio. Harris and Raviv (1991) have claimed, based on a field survey, “drugs, instruments, electronics and foods have low leverage while paper, textile, steel air lines, and cement have consistently large leverage”.

##### *2.4.2 Industrial Organization Variables and Capital Structure*

Industrial Organization variables: demand, supply of the product, cost parameters, strategic variables-price and quantity, bargaining game between management and suppliers, output, research and development and marketing (advertising) expenses, plant capacity, location, product characteristics and extent of competition may be related with capital structure (Harris & Raviv, 1991). In addition, Brander and Lewis (1986) argued that high strategic interaction in the product market results high leverage, oligopolistic organization uses more debts than monopolistic organization and most of the firms use long term debts. Besides, Maksimovic (1988) showed that elasticity of demand and debt level should be positively related. If high reputation of product quality is not required and products are not unique than high leverage will exist (Titman, 1984). To sum up, debt issue lowers cost and price of the products and increases profit.

#### *2.5 Other Theories of Capital Structure Choice*

##### *2.5.1 The Effect of Transaction Costs on Debt Ratio*

Fisher, Heinkel, and Zechner (1989) argued that transaction costs effect the capital structure. In addition, Leary and Roberts (2005) argued that the cost of issuing debt is substantially lower than the cost of issuing equity. Altinkilic and Hansen (2000) estimated the cost of issuing equity is about 5.38 per cent and the cost issuing debt is about 1.09 per cent. Graham and Harvey (2001) find moderate evidence in support of the explanation of Fisher, Heinkel, and Zechner (1989). In addition, Titman and Wessels (1988) argued that small firms are discouraged to issue debts because of transaction cost of debt. Graham and Harvey (2001) do not find enough support for the effect of transaction on debts.

##### *2.5.2 Corporate Control*

Harris and Raviv (1988) argued that capital structure is a tool to control the firm. In details, firms use more debt to have more control to the existing shareholders in the business instead of equity. Furthermore, the firms also use debt to avoid the take-over target of the influential firms. Graham and Harvey (2001) finds that equity is issued so that the share of a particular shareholder decreased but this decision is not related with managerial ownership and debt decisions & takeover threats are independent of debt decisions. Williamson (1988) argued that greater use of equity requires greater administrative type measures in order to reduce opportunistic behaviour of the managers. On the other hand, greater use of debt decreases strategic real options in the hand of managers.

#### *2.6 Corporate Strategy Perspective*

Strategy researcher Simerly and Li (2000) showed that the level of environmental dynamism is very important in capital structure planning and should be a determinant of capital structure. The environmental dynamism is a composite factor of effect of many factors. The rate, instability and magnitude of environmental change can be regarded as environmental dynamism. In addition, the number of firms in the sector and technological change are also included in the environmental dynamism. Figure-2 shows the three attributes of industry dynamics right hand side shows the characteristics of high environmental dynamism and left hand side shows the characteristics of low environmental dynamism.

Higher environmental dynamism means lower possibility of correct prediction of present and future state. Consequently, in future uncertainty environment, creative managerial decision plays important role in the success and survival of the organization. However, when firm increases debt in the capital structure, managerial

real options decreases in the hand of manager in future uncertain environment because of increase of covenants in the debt indenture. So, the level of environmental dynamism and the level of debt should be negatively for the firm's better performance. For example, the firms having high environmental dynamism should use low debt; the firms having low environmental dynamism should use high debt, and firms having medium level of environmental dynamism should use medium level of debt for the better performances. Environmental dynamism for each firm in the same industry will be the same while will be different for firms across the industries.

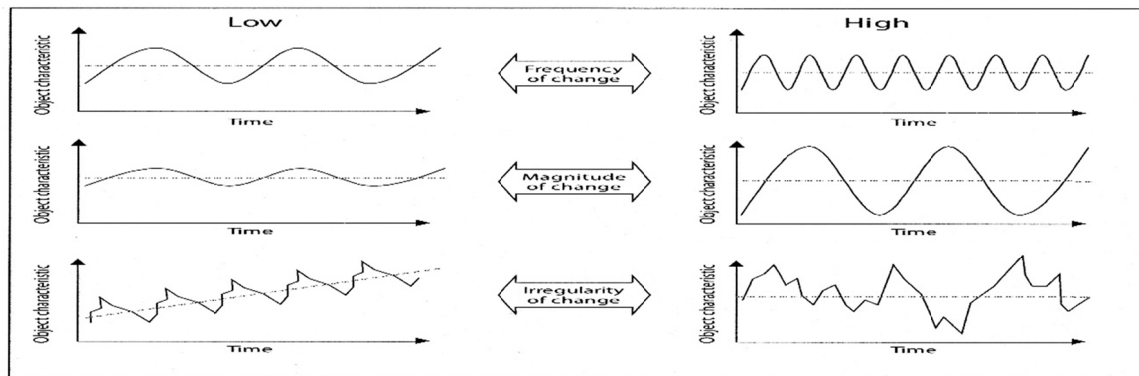


Figure 2. Attributes of industry dynamics

Source: Hauschild, Knyphausen-AufseB and Rahmel (2011).

### 3. Determinants or Control Variables of Capital Structure

There are various internal and external factors to determine capital structure of a firm. The macro variables of the economy of a country like tax policy of government, inflation rate, and capital market condition are the major external factors that affect the capital structure of a firm. The characteristics of an individual firm, which are termed here as micro/internal factors, also affect the capital structure of enterprises. Based on the literature review, the following determinants of capital structure are considered in this paper:

#### 3.1 Human Capital/Bargaining Power

Sarig (1988) argued that high unionized firms and firms have staff of easily transferable skills should use high debt. In addition, Chang (1992) argued that the firms using more debt pay less as salary and wages. Furthermore, Berk et al. (2010) did not find any evidence that firms will have to bear sizeable bankruptcy costs. They argued that costs of using debt are not generated from moral hazard or information asymmetry rather it is from human cost of bankruptcy. Like Berk et al. (2010), Matsa (2010) showed that debt can be used as a strategic variable in order to save in wages and salary. Consequently, the debt ratio and salary and wages ratio should have negative relationship. Matsa (2010) found significant and negative relationship but Graham and Harvey (2001) did not find any evidence to support the employee bargaining theory and concluded that debt is not used for employee bargaining.

#### 3.2 Size

Size is used as four proxies for (i) easy access to capital market, (ii) financing costs (iii) information asymmetry, and (iv) sufficiency of internal funds. Firstly, large firms are well known in the market, have more access in the capital market, more diversified, less vulnerable to the business cycles and business risk and hence can borrow at the favourable interest rate compare to the small firms in the finance markets. Hence, trade-off theory predicts that size and leverage should be positively related. Huang and Song (2002), Rajan and Zingales (1995), and Friend and Lang (1988) reported positive relationship between size and financial leverage. Secondly, Smith (1977) argued that size can be a proxy for financing costs. Larger firms pay comparatively lower amount compare to small firms for equity issue and long term loans. As a result, smaller firms will be less levered than larger firms and will prefer short-term compare to long-term debts. So, here also, a positive relationship is expected.

Thirdly, size can be a proxy for information asymmetry. Large size means large information to the outside investors, and less information asymmetry (Fama & Jensen, 1983) and low possibility of under pricing of equity.

As a result, larger firms can issue more equity to raise funds (Rajan & Zingales, 1995). Hence, size of the firm should be negatively related with leverage according to pecking order theory. Finally, the pecking order theory (Myers & Majluf, 1984) argues that large or old firms can fulfil financing needs from internal sources. Hence a negative relationship is expected. Kester (1986), Kim and Sorensen (1986) and Titman-Wessels (1988) reported negative relationship. Three proxies are used by the researches to present size in their different studies: the logarithm of the sales of the firm, logarithm of the total assets and logarithms of the no. of employees.

### 3.3 Growth Opportunities

Growth opportunities do not generate present income, cannot be collateralized, increases high agency cost of debt, reduce free cash flow and hence generate low agency cost of managerial discretion. Growth opportunities have present value but, if growing firms face financial distress and then bankruptcy, the growth opportunities do not add any value to the value of the firm. Hence the growth firms offer higher agency cost and possibility to invest sub-optimally. So, growing firms should have less debt but more equity financing (Myers, 1977). As a result, trade off theory predicts a negative relationship between expected growth opportunities and leverage ratio. Smith and Watts (1992), Titman and Wessels (1988) reported a negative relationship between growth opportunities and the leverage.

However, Titman and Wessels (1988) and Myers (1977) argued that if firms' uses short term financing for long-term financing these problems can be minimized. Hence short-term financing should be positively related with growth opportunities. Jensen and Meckling (1976), Smith and Warner (1979), and Green (1984) argued that the agency costs of growth opportunities could be minimized if the projects would be financed by convertible debts. Hence growth opportunities and convertible debts should be positively related. In addition, a positive relationship may exist as larger growth opportunities means larger demand for funds for investments. As a result, firm will use debt financing instead of equity financing as pecking order theory (Myers & Majluf, 1984) predicts. Market to book value ratio is widely used proxy to present growth opportunities. Myers (1977) argued that market value to book value ratio can be higher on the prediction that future cash flows will be higher from the operations. In practice, Rajan and Zingales (1995), Adam and Goyal (2008) used this variable as proxy. However, this ratio is not useable, if stock mispricing occurs. Other proxy variables used by researchers to present growth opportunities of the firms are capital expenditure to total assets, research & development over sales. Titman and Wessels (1988) used growth in assets to present growth opportunities.

### 3.4 Profitability

Profitable firm has lower expected cost of bankruptcy. As a result, According to the trade-off theory, profitable firm should take debt up to a level to receive the tax shield advantage. Besides, free cash flow hypothesis (Jensen, 1986) argues to use more debt for profitable firms to reduce available cash to the managers to reduce inefficient use of the fund by managers. As a result, a positive relationship should exist. However, the relationship may be inversed-negative, if the dynamic trade off model is in application (Strebulaev, 2007). Unlike static trade off model, dynamic trade off model predicts the relationship between profitability and leverage can be negative as profitable firms passively accumulate profits (Kayhan & Titman, 2007). Besides, pecking order theory (Donaldson, 1961; Myers, 1984; Myers & Majluf, 1984) argues that financing strategy of a firm depends on the preference of financing, and because of information asymmetry and transaction costs, firm uses internal funds first and external sources second. When external fund is necessary to raise funds, debt is preferred to equity. Since profitable firms can manage fund from internal sources, the profitability and the leverage should be negatively related. Rajan-Zingales (1995), Huang and Song (2002), Titman and Wessels (1988), Friend and Lang (1988) and Kester (1986) reported negative relationship between profitability and leverage. The widely used proxy variables are-the ratio of earnings before interest, tax and depreciation over total assets (Rajan & Zingales, 1995, Bevan et al., 2002), and operating income (EBIT) divided by total sales (Titman & Wessels, 1988).

### 3.5 Industry Classification

Financial leverage varies from industry to industry. Ross, Westerfield and Jaff (2012), Bradley et al. (1984) and Lemmon, Roberts, and Zender (2000) argued that capital structure is industry specific. As evidence, Bradley et al. (1984) showed that industry classification can explain 54 per cent of the variations in the debt ratio. Furthermore, Harris and Raviv (1991) based on a field survey have claimed that "drugs, instruments, electronics and foods have low leverage while paper, textile, steel air lines, and cement have consistently large leverage". Besides, Titman (1984) argues that the firms producing sensitive products uses less debt so that the customers and the suppliers do not become worried about their firms become financially distressed.

There are two possible reasons for being the industry classification significant. Hovakimaian Hovakimaian and Tehranian (2004) argued that industry includes some omitted factors and hence become significant. The omitted

factors may be industrial organization variables not included in other types of variables. Firms in the same industry face the same types of forces to set financing strategy hence has different debt level compare to firms in the other sectors (Frank & Goyal, 2009). The factor could reflect industry heterogeneity in terms of sales, assets, business risk, need of finance, range of products, opportunity to access to finance markets, seasonal needs, technology or regulation and competition etc. Another explanation is that firms set industry median leverage as firms' target leverage. If there are any deviation from the targets than firms move to the industry median leverage. Gilson (1997), Hull (1999), Hovakimian, Opler, and Titman (2001), Faccio and Masulis (2005), and Flannery and Rangan (2006) presented and supported this argument.

The trade-off theory predicts that higher industry median average enforces higher leverage and higher industry median growth will enforce lower financial leverage. In addition, when regulated dummy is considered, regulated firms have stable cash flows and possess lower expected cost of financial distress and hence should have higher financial leverage. By contrast, regulated firms have low possibility of managerial discretion, that reduces agency cost between shareholders and managers hence encourages lower of debts. Industry median average leverage, industry median growth leverage and regulated dummy and dummy variables are used to check the effect of industry classification on the capital structure of the firm.

### 3.6 Environmental Dynamism

There is no unique index or method for measuring environmental dynamism. However, Boyd (1995), Dess and Beard (1984), Keats and Hitt (1988), Rasheed and Prescott (1992), Wholey and Brittain (1989) suggested a measure called environmental dynamism index to measure environmental dynamism is widely used. The environmental dynamism index is estimated by running a regression for each industrial sector. In details, a regression of sales on time dummy variable is conducted for each industrial sector and the standard errors of time dummies are divided by average sales value to generate the index. A negative relationship is expected between leverage and environmental dynamism is expected for the better performance. Simerly and Li (2000) reported a negative relationship. Figure-3 describes the relationship between environmental dynamism, leverage and firm performance.

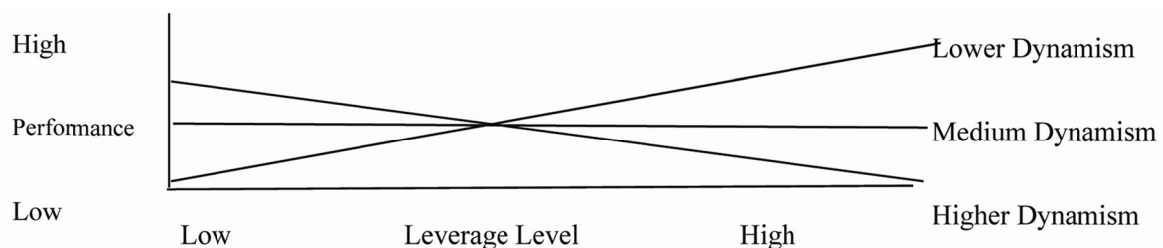


Figure 3. An illustration of different leverage level, dynamism levels & performances

### 3.7 Tangibility of Assets

Firms having more intangible assets can face difficulty in debt financing as intangible assets are not accepted as collateral because of difficulty in valuation of intangibles assets. Besides, Jensen and Meckling (1976), Galai and Masulis (76), Myers (1977) argued that asset substitution may take place or firms can invest sub-optimally during financial distress. Consequently, financial institutions and banks ask corporations for the collateral at the time of lending because of agency costs of the debts to save them (Jensen & Meckling, 1976). Furthermore, if debt is collateralized, the loan could not be used in unauthorized projects. In addition, Scott (1977) argued that firms increase the value of the equity holders by issuing secured debt in the expense of unsecured creditors. Hence trade-off theory predicts that firms' tangibility should be positively related with the leverage. Moreover, Pecking order theory (Myers & Majluf, 1984) argued that firms find convenient issuing secured debts compared to issuing equity because of asymmetric information and transaction costs. These costs can be eliminated by issuing secured debt against tangible assets with known values. Thus firms having more tangible assets can take more secured debts.

On the other hand, collateralize able assets and financial leverage may be negatively related for three reasons: (i) managers' propensity of consuming more perquisites compare to optimal consumption, (ii) presence of bulk unique assets and (iii) asymmetric information about the assets value. Firstly, Grossman and Hart (1982) argued that by adding debt in the capital structure, the consumption of perquisites can be reduced. Because adding debt



as capital increases possibility of bankruptcy also. As a result, managers will not consume excess as they will lose their jobs, if the firms face bankruptcy. So, by adding more debts in the managers could be aligned. Secondly, Stakeholder co-investment theory predicts that firms having more unique assets have very specialized labour and add larger liquidation cost at liquidation time. So, firms having more unique assets should have lower financial leverage (Titman, 1984). In order to control unique assets those acquired and accumulated from discretionary expenses- selling, general and administrative expenses, and research and development expenses, should have lower debt. Finally, if asymmetric information is about fixed assets in place, financial leverage should be lower. Rajan and Zingales (1995), Titman and Wessels (1988), and Friend and Lang (1988) reported a positive relationship, whereas Booth et al. (2001) and Huang and Song (2002) reported a negative relation between tangibility and leverage. The variables used to measure nature of the assets are: tangibility, research and developments expenses, uniqueness dummy, and selling, general and administrative expenses to sales.

### 3.8 Tax Rate

Trade-off theory predicts that companies under the higher tax rate should use more debt to receive more tax advantage. However, Fama and French (1998) declared use of debt in the capital structure has no net advantage. In addition, Mackie-Mason (1990) claim: "Nearly everyone believes taxes must be important to financing decision, but little support has been found in empirical analysis". Tax may negatively significantly affects financial leverage when owners of the industries want to pay higher tax and use less amount of debts to become commercially important person (CIP) in the country. Matheson (2006) supported the negative effect of tax on the leverage. The proxies are (1) Tax rate = tax paid/total assets, (2) NOL carry forwards/assets.

### 3.9 Supply-Side Factors

*Credit Rating:* Supply side of the credit also plays important roles in capital structure variations (Faulkender & Petersen, 2006). Firms' intention to add debt in the capital structure may be hampered because of restriction in the market from the debts supplier's side. Firms' poor credit rating may be a problem to raise debt from the market. Similarly, non-credit rated firms may have disadvantageous position compare to credit rated firm. So, Firms facing restriction in the access to raise funds from the credit markets will use more equity. However, credit rating is one kind of publish-out of information. High rated firms have less information asymmetry problem and those firms should use more equity and less debt under the prediction of trade-off theory. Two types of proxies are used to represent this variable: dummies for credit ratings, and dummy for rated and non-rated firms.

### 3.10 Debt Market Conditions

Barry et al. (2008) argued that firms use more debt when present interest rate is lower than the historical interest rate. Higher inflation means paying lower to the lender at the time of inflation and real value of tax advantage which is higher at the time of inflation (Taggart, 1985) may result positive relationship between inflation and leverage under the prediction of Trade-off theory. Market timing theory is also predict a similar relationship if the managers issue debts when inflation rate is higher compare to current interest rate (Ritter & Warr, 2002). Term spread is a very credible variable to present the economic growth and economic prospects. If larger term spread means larger growth, agency cost theory predicts, term spread and leverage should be negatively related. Frank and Goyal (2009) used two proxy variables are (i) inflation rate and (ii) term spread rate.

### 3.11 Macroeconomic Conditions

Macroeconomic condition and leverage of a firm may be related: during expansion of the economy leverage may be positively related and contraction may be negatively related. In the expansion phase, business grows up at a very good rate, industrial production goes up, employment goes up, stock prices goes up and corporate profitability goes up. Gertler and Gilchrist (1993) argued that during expansion followed by recession induced by monetary contraction, financial leverage is increased by large firms and the financial leverages remains unchanged for small firms. During business expansion phase of business cycle, packing order theory predicts that firms can generate money for financing from internal sources. Consequently expansion and financial leverage should be negatively related. However, bankruptcy cost theory predicts that bankruptcy cost for growth opportunities are high and hence leverage and macroeconomic growth should be negatively related. Macroeconomic variables-GDP growth, EBIT growth, money growth and industrial production growth/ index of leading indicators may be related with financial leverage.

### 3.12 Stock Market Conditions

Stock market and leverage may be related. Welch (2004) argued that as the capital structure of a company is not rebalanced with the shock of stock prices, the relationship only be estimated with the leverage and the stock market return. A negative relationship is expected between leverage and stock return. The market timing theory

also supports that. Besides, time-varying adverse selection also predicts negative relationship between stock price and leverage. In consistent with many authors, Korajczyk, Lucas, and McDonald (1990), Bayless and Chaplinsky (1991) argued that the stock issue is followed by increases in share prices. Frank and Goyal (2009) summarized the relationship those could be checked by between stock market and leverage are: (i) growth (ii) adverse selection cost (iii) asset price change and (iv) market timing and considered two variables to represent the stock market and leverage relationship: (i) Cumulative raw returns and (ii) Cumulative market returns.

### *3.13 Uniqueness*

Titman (1984) argued that firms producing sensitive product uses less debt so that customers, workers and the supplies do not become worried that their firms become financially distressed. In general, firms producing unique products employee job specific human resources with specific skills. At the same time, suppliers supply specific and unique materials and customers purchase unique products which are not common in the market. Consequently, firms producing unique products create huge cost if face liquidation. So, uniqueness and financial leverage should be negatively related.

However, uniqueness can positively affects the financial leverage when uniqueness is explained by information asymmetry theory. Uniqueness is represented by selling, general and administrative expenses or research and development expenses. But investment in selling, general and administrative expenses or in research and development expenses are like investment in intangible assets which are more sensitive on the way to adverse selection problem. As a result, debts are more used with the increase in SGA or/and R&D. Mazur (2007) and Wei (2014) supported the negative effect of uniqueness on the financial leverage.

The most widely used variables are: research and development expenses, selling, general and administrative expenses, and quit rates. Research and development expenses are dedicated for the future products and development which cannot be easily duplicated by competitors in the market. As a result, research and development could be a good proxy for uniqueness. Selling, general and administrative expenses are higher for unique products. So, this is also another candidate to be a proxy for uniqueness. The quit employees rate- quit employees to total employees can be another proxy to represent uniqueness of the firm as employees having job specific skills may find it costly to leave the job.

### *3.14 Business Risk / Volatility*

Business risk is the possibility of being failed in the business. In this study, higher variability of return on assets is treated as the higher business risk and lower variability of return on assets is considered as the lower business risk. Business risk should be negatively related with the financial leverage under trade-off theory. The proxy variables are- the standard deviation of the first differences in the ratio of EBIT over total assets (Wald, 1999).

### *3.15 Non-Debt Tax Shield*

Modigliani and Miller (1963) argued for using tax in order to receive enormous tax shield advantage whereas DeAngelo and Masulis (1980) advocated for non-debt tax shield (NDTS) is an alternative to the tax shield. Other expenses than interest expenses those are reducing tax payments are termed as non-debt tax shield. As tax payments are reduced by NDTS, firms writing off high depreciation and enjoying investment tax credits can go for low debt. Hence, non-debt tax shield could be negatively related with the leverage. On the other hand, the company having higher NDTS, having higher collateral-able fixed assets. Because of having higher collateral-able fixed assets, the industry can use more debts. Hence, non-debt tax shield could be positively related with the leverage. Downs (1993) presents evidence for the positive effect of NDTS on leverage. The commonly used proxies are depreciation to total assets, investment tax credits to total assets, total non-debt tax shield to total assets.

### *3.16 Age of the Firm*

Age of the firm can be related with leverage positively or negatively. Firstly, age of the firm should be positively related with the debt ratio. In the beginning, normally firms hold equity more than debts. So gradually it gets time to increase debt in the capital structure. Firms maturing gradually, have more intensive relationship with bank and financial institutions, higher information about the debt market and hence higher leverage. Secondly, leverage and age of the firm should be negatively related as maturing firm gets more time to increase equity in the capital structure because of less of information asymmetry and low possibility of under-pricing.

### *3.17 Dividend Pay-Out*

Fama and French (2002) and Byoun (2008) argued that dividend policy and financial leverage should be considered simultaneously. There are two variables to check the relationship between leverage and dividend

pay-out. Here, dividend included only cash dividend not stock dividend and other forms of dividend. It can be defined as either the ratio of dividend to total income available to shareholders or dividend to total assets.

### 3.18 Financial Distress

Altman Z score which is modified by MacKie-Mason (1990) is widely used by financial economist as a proxy for financial distress. It measures ex-ante probability of financial distress (Graham, 1996, 2000). The modified  $Z = 3.3(\text{EBIT} / \text{total assets}) + 1.0(\text{sales} / \text{total assets}) + 1.4(\text{retained earnings} / \text{total assets}) + 1.2(\text{working capital} / \text{total assets})$ . Financial distress negatively affects leverage. However, financial distress positively significantly affects financial leverage when an industry in the financial distress issues debts to get rid of financial distress. Lee, Koh, and Kang (2011) showed that financial distress positively and significantly affects leverage.

### 3.19 Agency Cost

Agency theory (Jensen & Meckling, 1976; Jensen, 1986) argued that “the optimal structure of leverage and ownership may be used to minimize total agency costs”. Following the works of Jensen and Meckling and Jensen, it is accepted that the ownership structure has influence on the leverage. The conflict between the principal and agent can be minimized if the largest shareholder monitor the activities of the agent. Consequently, firms can use more equity if single shareholder holds the large proportion of the total shares. Hence largest percentage shareholder's shareholding should affect the financial leverage negatively. Leland and Pyle (1977) and Berger, Ofek, and Yermack (1997) supported the relationship. Table 2 summarizes candidates for the determinants of the capital structure and their indicators with definitions.

Table 2. Candidates for the determinants of the capital structure and their indicators with definitions

Constructs	Indicators	Definition of Indicators
<b>(b) Determinants</b>	(Causes)	
Human Capital	TSW/TA	Total Salary and Wages to Total Assets
Size of the Firm	LnS	Natural Log of Total Net Sales
	LnA	Natural Log of Total Assets
	LnE*	Natural Log of Total Number of Employees
Growth Opportunities	R&D/S	Research and Development Expenses to Sales
	CE/TA*	Capital Expenditure to Total Assets
	M-to-B*	Market to Book Value
Profitability	GTA	Growth in Total Assets (= Change in Nature Log of Total Assets)
	EBITD/TA	EBITD over total assets (= Cash flow from operations over total asset)
	EBIT/TA	Operating income (EBIT) divided by total sales
Industry Classification	MD	Industry Median Average Leverage
	Median G*	Industry Median Growth Leverage
	Dummy*	Dummy Variable for Industry Classification
	ED*	Environmental Dynamism
Tangibility of Assets	FA/TA	Fixed Assets To Total Assets
	R&D/S	Research and Development Expenses to Sales
	SGA/S	Selling, General And Administrative Expenses To Sales
Tax Rate	Tax Rate	Total Tax/Total Assets
	D/TS	Depreciation/Total Assets
Credit Rating*	Rating	Dummy for Credit Rating
	Dummy	Dummy for Rated Non-rated Firms
Debt Market Conditions	Inflation	Inflation Rate
	T-Spread*	Term Spread Rate
	GDPG	GDP Growth
Macroeconomic Conditions	EBITG	EBIT Growth,
	MG	Money Growth
	IPG	Industrial Production Growth
Stock Market Conditions*	CRR	Cumulative Raw Returns
	CMR	Cumulative Market Returns
Uniqueness	R&D/S	Research and Development Expenses to Sales,
	SGA/S	Selling, General and Administrative Expenses to Sales
	Quit Rates*	Quit Rates

Business Risk	BR	$\sigma$ of the first differences in the ratio of EBIT over total assets
Non-debt Tax Shield	D/TA	Depreciation/Total Assets
	ITC/TA*	Investment Tax Credits/Total Assets
Age of the Firm	Age*	Age of the Firm After Listing
Dividend Payout	Div/I*	Dividend Paid/Net Income
	Div/TA	Dividend Paid/Total Assets
Financial Distress	Modified-Z	Altman Z Score-Modified by MacKie-Mason (1990)
Agency Cost	LS	% of Shares held by Largest Shareholders

Source: Literature Review, \*data was not available on the measures for this study.

#### 4. Measures of Capital Structure

In order to determine the determinants of capital structure, it is important to define capital structure or financial leverage. The capital structure is the combination of debt and equity (Horne, 2002). But the word “Capital Structure” has different meaning to different authors. Leverage measure can be defined in terms of convertible bond, short-term debt, long term debt, and total debt. In addition, Measures of leverage can be defined on the basis of inclusion of total liabilities, total assets, net assets, interest expense and EBIT, EBITD. Similarly, leverage can be measured in terms of market value and book value. Thus, it is noticeable that leverage for the same firm can be different based on the variables used to calculate the financial leverage. Which measure should be used is depending on the objective of the measurement.

In defining leverage and determining the determinants of leverage-book value based leverage should be used for several reasons. Myers (1977) argued for book value as it represents assets in hand and not affected by growth opportunities. In addition, book value does not fluctuate and realistic as corporate finance policy guide. Market value comes from share market. But capital structure is not rebalanced after changes in stock price for the rearrangement costs. However, market value based leverage should be used for convincing following reasons. Market value is consistent with wealth maximization goal of the corporate organization. Market value is also managerially relevant (Welch, 2004). Moreover, book value can be negative but asset cannot be negative. Finally, book value is plug number, and book value is backward looking, but, market value is forward looking. As a result, Barclay, Morellec, and Smith (2006) argued that there is no reason to match the two value.

In consistent with the above discussion, Harris and Raviv (1991) summarize the matters as ‘the interpretation of the results must be tempered by an awareness of the difficulties involved in measuring both leverage and the explanatory variables of interest. In measuring leverage, one can include or exclude accounts payable, accounts receivable, cash and other short-term debt. Some studies measure leverage as a ratio of book value of debt to book value of equity, others as book value of debt to market value of equity, still others as debt to market value of equity plus book value of debt. In addition to measurement problems, there are the usual problems with interpreting statistical results’. The possible measures of financial leverage are discussed in following.

##### 4.1 Total Liabilities / Total Assets

This is the broadest measure of financial leverage and could be a measure of what is left for the equity holders at the time of liquidation. However this measure does not tell about the level of risk of bankruptcy in the near future. This measure has some other problems. For example, total liabilities include some liabilities which are not related with financing but used for transaction purpose. In the same way, pension liabilities arising from labour contract markets influence this ratio. Hence liabilities like accounts payable, pension liabilities overstate this ratio.

##### 4.2 Total Debt / Total Assets

A better measure for financial leverage is total debt to total assets. The liabilities like untaxed reserve and accounts payable do not affect this ratio. As the non-debt liabilities offset some assets which are not considered in this ratio, this ratio as measure of financial leverage is problematic. For example, trade credit level influence this ratio substantially. So, this measure cannot be a true measure of financial leverage. All of the researches used this ratio as a measure of financial leverage.

##### 4.3 Total Debt / Total Net Assets

A corrected measure of the above ratio is total debt to total net assets ratio. This ratio is calculated after the adjustment of total assets for non-debt liabilities. This ratio is not affected by trade credit. Total net assets are equal to total assets minus accounts payable minus other liabilities. The ratio is still influenced by assets held

against pension liabilities.

#### 4.4 Long-term Debt / Total Assets

Short term debts are used for mainly transaction purpose while long-term debts are used for financing purpose. So, the ratio should be long-term debt to total assets. All of the researches used this ratio as a measure of financial leverage.

#### 4.5 Short-Term Debt / Total Assets

Titman and Wessels (1988) and Myers (1977) argued that growing firms should use short-term. Flannery (1986) argued that firm borrows short-term, if there is a possibility of improvement in the credit rating of the firm in future. Bevan and Danbolt (2002) finds significant difference in the determinants of corporate capital structure between short-term and long term debt. They also argued that firm chooses short-term as short term is cheaper than long term debts. Besides, the author of this paper has observed that many companies in the developing country do not have any long term debt. Graham and Harvey (2001) finds that, in general, credit rating is important in debt decision making but not used in making decision between short-term vs long-term.

#### 4.6 Convertible Debt / Total Assets

By issuing convertible debt firm pays low as coupon rate and lender can convert the debt to equity or cash in future at maturity date. Pecking order theory argues that, because of information asymmetry and transportation cost, companies should use internal fund for financing first, debt second, then convertible debt and equity last. The firms having low credit rating and high growth use convertible debt. Jensen and Meckling (1976), Smith and Warner (1979), and Green (1984) argued that the agency costs of growth opportunities could be minimized if the projects would be financed by convertible debts. Because of the implication of convertible debt financing, in this study capital structure is considered in convertible debt also. The ratio to measure capital structure is convertible debt to total assets.

#### 4.7 Debt / (Debt + Equity)

Weston and Brigham (1984) have defined the capital structure as “Capital Structure is the permanent financing of the firm, represented primarily by long-term debt, preferred stock and common equity, but excluding all short-term credit. Thus, a firm’s capital structure is only a part of its financial structure. Common equity includes common stock, capital surplus, and accumulated retained earnings”. Agency theory developed by Jensen and Meckling (1976), Myers (1977) are concerned and based on agency cost of debt, and agency cost of equity. Consequently, a debt to equity ratio is more relevant. But if a company uses zero equity, then the debt to equity ratio becomes infinity. So the modified equivalent ratio is debt to debt plus equity ratio. Ross et al. (2012) used this ratio to explain the relationship between agency cost and increase in debt. Rajan and Zingales (1995) described the ratio as best for representing past financing behaviour.

The above each ratio should be two based on whether book value or market valued is used in the denominator.

#### 4.8 EBIT / I

Aghion and Bolton (1992) considered capital structure in terms of control of ownership and hence capacity of payment of interest payment is very important. As a result, a measure of interest coverage is more relevant as a capital structure ratio. The interest coverage ratio is EBIT/I. This ratio is all right if an investment equivalent to depreciation is needed to keep the business on going. The ratio is calculated based on the assumption that short-term liabilities and short-term debt will be renewed. In addition, this ratio is very responsive to income oscillation.

#### 4.9 EBITD / I

If investment equivalent to depreciation is not required for keeping the business ongoing than appropriate interest coverage ratio is earning before interest, taxes and depreciation (EBITD) divided by interest (I). This ratio is also based on the assumption that short-term liabilities and short-term debts will be renewed. This ratio is also very sensitive to earning variation.

At the time of conducting, research in corporate capital structure, the researchers should keep the above measures of financial leverage in their minds. Table 3 summarizes measures of capital structure and their definitions.

Table 3. Constructs, indicators of effects and definition of indicators of effects

Constructs	Indicators of Effects	Definition of Indicators
Capital Structure	TL/TA	Total Liabilities/Total Assets
	TD/TA	Total Debt/Total Assets
	TD/TNA*	Total Debt/Total Net Assets
	LTD/TA	Long Term Debt/Total Assets
	STD/TA	Short Term Debt/Total Assets
	CD/TA*	Convertible Debt/Total Assets
	D/(D/E)	Debt/(Debt + Equity)
	EBIT/I	Earnings Before Interest and Tax to Total Interest Paid
	EBITD/I	EBIT & Depreciation to Interest Paid

Source: Literature Review, \*measures not used in this study.

## 5. Some Empirical Evidences

### 5.1 Correlation between the Book Value Based Leverage Ratios

Leverage can be defined in many ways based on the objective of the study. Table 4 shows the correlation coefficients of all possible pairs of financial leverage based on book value. The table shows that total-debt is positively strongly related with short-term debt (0.82) and positively moderately related with long-term debt (0.54). TD/(TD+TE) and TD/TA is positively strongly correlated (0.83). LD/(LD+TE) and LD/TA is positively strongly correlated (0.91). In addition, EBIT/I and EBITD/I are positively perfectly correlated (1.00) but EBIT/I and EBITD/I are not correlated with other financial leverage ratios. Thus EBIT/I and EBITD/I and other financial leverage ratios represent different aspects of financing. Total liabilities ratio is not related with any other leverage ratio. Hence should not be a candidate for the financial leverage ratio.

Table 4. Correlation between the Leverage Ratios

Debt Ratios	STD/TA	LTD/TA	TD/TA	TL/TA	TD/(TS+TE)	LD/(LD+TE)	EBIT/I	EBITD/I
STD/TA	1.00							
LTD/TA	0.02	1.00						
TD/TA	<b>0.82</b>	<b>0.54</b>	1.00					
TL/TA	-0.06	-0.07	-0.08	1.00				
TD/(TS+TE)	<b>0.62</b>	<b>0.57</b>	<b>0.83</b>	-0.08	1.00			
LD/(LD+TE)	0.03	<b>0.91</b>	<b>0.50</b>	-0.06	<b>0.69</b>	1.00		
EBIT/I	-0.06	-0.19	-0.16	-0.03	-0.17	-0.17	1.00	
EBITD/I	-0.06	-0.19	-0.15	-0.03	-0.16	-0.17	<b>1.00</b>	1.00

Source: Author's Calculations.

### 5.2 A Leverage Ratio and the Square of that Leverage Ratio

A leverage ratio and the square of that leverage ratio is very strongly positively correlated. The financial leverage defined by short-term debts to total assets and its square is positively strongly related (0.93), The financial leverage defined by long-term debts to total assets and its square is positively strongly related (0.95), The financial leverage defined by total debts to total assets and its square is positively strongly related (0.95). Consequently, both term cannot be included in the same regression analysis like Margaritis and Psillaki, (2010).

### 5.3 Short-Term Debt Is Three Times of Long-Term Debt

On an average, short-term debt is three times more than long-term debt in the sample industry. The reasons is that, in the developing country like Bangladesh, many companies face difficulty to raise long-term finance from capital market. Consequently, the companies' largely depends on short-term loan for the financing purpose. As a result, it is expected that the short-term debt and total debt will be positively strongly related. As expected, the short-term debt ratio and the total debt ratio is positively strongly correlated (0.82). Two companies do not have any short-term debts and five companies have any long-term debts. One company (seven observations) has neither short-term nor long-term debt.

#### 5.4 Tax Payments

Out of eighty-four firm-year observations, ten observations (12 per cent) did not pay any tax. Twenty five observations (30 per cent) pay less than 1 per cent of total assets as tax. The company that pays highest tax compare to total assets-pays 9.20 per cent as tax.

#### 5.5 Research and Development Expenses

Out of eighty-four firm-year observations, fifty seven observations (68 percent) do not have any research and development expenses. The observation that pays highest research and development expenses to sales-pays 0.44 per cent of sales.

#### 5.6 Correlation between Book Value of Assets(BVA) Based and Market Value of Assets (MVA) Based Leverage

Table-5 shows the correlation coefficients between the book value based and market value based leverage. The correlation coefficient between STD/BVA and LTD/BVA is 0.41, TD/BVA and TD/MVA is 0.45, LD/BVA and LD/MVA is 0.74. Consequently, leverage defined based on book value and market value are not strongly correlated and presents different information.

Table 5. Correlation between book value based and market value based leverage

Variables	STD/BVA	LTD/BVA	TD/BVA	TL/BVA	STD/MVA	LTD/MVA	TD/MVA	TL/MVA
STD/BVA	1.00							
LTD/BVA	0.02	1.00						
TD/BVA	<b>0.81</b>	<b>0.54</b>	<b>1.00</b>					
TL/BVA	-0.07	-0.08	-0.10	1.00				
STD/MVA	0.41	0.06	0.35	-0.06	1.00			
LTD/MVA	-0.05	<b>0.74</b>	0.35	-0.05	0.27	1.00		
TD/MVA	0.29	0.40	0.45	-0.07	<b>0.88</b>	<b>0.68</b>	<b>1.00</b>	
TL/MVA	-0.07	-0.04	-0.08	0.95	0.11	0.10	0.13	1.00

Source: Author's Calculations.

#### 5.7 Determinants of Capital Structure

##### 5.7.1 Correlation between the Indicators of the Determinants

Data is collected on 23 indicators of the determinants. To check the multi-co-linearity, a Pearson's correlation coefficients analysis is conducted before conducting the regression analyses. The natural log of net sales and natural log of total assets are positively strongly correlated (0.88). Besides, growth in total assets and EBITG are positively strongly correlated (0.95). OCF/TS and OI/TA are positively perfectly correlated (1.0). The median of total debts to total assets (MTD/TA) and the median of short-term debts to total assets (MSD/TA) are positively strongly related (0.91). Money growth is negatively strongly related with MTD/TA (-0.822) and MSD/TA (-0.734), GDPG is positively strongly related with inflation rate (0.847). Because of strong correlation, lnS, OI/TA, IR, EBITG and MG are dropped from the data analysis. MSD/TA, the median of long term debts to total assets (MLD/TA), and MTD/TA is included in the model define for short-term debts, long-term debts and total debts respectively. MG only included in the equation of long-term debts as it was not correlated with the median long-term debts.

In addition, DeAngelo and Masulis (1980) argued that the non-debt tax shield is an alternative of the tax advantage. However, the correlation analysis shows that the tax rate and the non-debt tax shield are not related (0.19). Many financial economists used R&D/S or SGA/S as a proxy variable to present uniqueness of the product. But the correlation analysis shows that R&D/S and SGA/S are not significantly related (0.16).

##### 5.7.2 The Empirical Models

$$STD = \alpha + \beta_1 MD_{i,t} + \beta_2 TSW_{i,t} + \beta_3 LnA_{i,t} + \beta_4 GTA_{i,t} + \beta_5 CFO_{i,t} + \beta_6 FA_{i,t} + \beta_7 Tax_{i,t} + \beta_8 NDTs_{i,t} + \beta_9 R\&D_{i,t} + \beta_{10} SGA_{i,t} + \beta_{11} Div_{i,t} + \beta_{12} LS_{i,t} + \beta_{13} BR_{i,t} + \beta_{14} GDPG_{i,t} + \beta_{15} IPG_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$LTD = \alpha + \beta_1 MD_{i,t} + \beta_2 TSW_{i,t} + \beta_3 LnA_{i,t} + \beta_4 GTA_{i,t} + \beta_5 CFO_{i,t} + \beta_6 FA_{i,t} + \beta_7 Tax_{i,t} + \beta_8 NDTs_{i,t} + \beta_9 R\&D_{i,t} + \beta_{10} SGA_{i,t} + \beta_{11} Div_{i,t} + \beta_{12} LS_{i,t} + \beta_{13} BR_{i,t} + \beta_{14} GDPG_{i,t} + \beta_{15} IPG_{i,t} + \beta_{16} MG_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$TD = \alpha + \beta_1 MD_{i,t} + \beta_2 TSW_{i,t} + \beta_3 LnA_{i,t} + \beta_4 GTA_{i,t} + \beta_5 CFO_{i,t} + \beta_6 FA_{i,t} + \beta_7 Tax_{i,t} + \beta_8 NDTs_{i,t} + \beta_9 R\&D_{i,t} + \beta_{10} SGA_{i,t}$$

$$+\beta_{11}Div_{i,t}+\beta_{12}LS_{i,t}+\beta_{13}BR_{i,t}+\beta_{14}GDPG_{i,t}+\beta_{15}IPG_{i,t}+\varepsilon_{i,t} \quad (3)$$

Where i refers to the individual industry and t refers to the time

### 5.7.3 The Empirical Results

Table-8 shows that the Uniqueness (SGA/S) positively significantly and size, tangibility, agency costs negatively significantly affects financial leverage defined by short-term debts to total assets. NDTs and R&D positively significantly and tax rate; selling general & administrative expenses; dividend payout rate; business risk; GDP growth; and money growth negatively significantly affects financial leverage defined by long-term debts to total assets. Industry median, R&D, positively significantly and tangibility, tax, dividend, and agency cost negatively effects financial leverage defined by total debts to total assets. (Table 8). Many researchers applied either selling, general and administrative or research and development expenses to represent uniqueness. However, this study shows that the variables are not correlated and both are significant determinant.

Table 6. OLS regression results

Name of Variable	STD/TA	LTD/TA	TD/TA
intercept	106.968*** (2.915)	41.672 (1.192)	105.084** (2.579)
MD/TA	0.456 (1.046)	0.828 (1.089)	0.616** (2.423)
TSW/TA	-20.290 (-1.355)	5.562 (0.508)	-14.830 (-0.861)
LnA	-2.148* (-1.954)	1.235 (1.552)	-1.259 (-1.006)
GTA	1.850 (1.171)	-0.468 (-0.409)	1.083 (0.603)
CFO/TA	-0.354 (-0.004)	0.368 (0.057)	1.506 (0.153)
FA/TA	-27.301*** (-3.597)	-6.577 (-1.184)	-30.174*** (-3.457)
Tax/TA	-39.795 (-0.545)	-205.008*** (-3.874)	-258.286*** (-3.098)
D/TA	-154.982 (-1.202)	336.010*** (3.602)	168.110 (1.143)
R&D/S	201.824 (0.135)	3346.609*** (3.091)	3990.266** (2.338)
SGA/S	60.419** (2.221)	-43.961** (-2.224)	22.988 (0.739)
Div/TA	-37.819 (-1.128)	-55.073** (-2.249)	-80.916** (-2.113)
Largest Share% (LS)	-0.441*** (-3.948)	0.096 (1.186)	-0.350*** (-2.733)
BR	15.365 (1.063)	-34.648*** (-3.316)	-19.685 (-1.198)
GDPG	-2.819 (-0.667)	-7.268* (-1.713)	-5.245 (-1.056)
IPG	0.368 (0.683)	0.534 (1.397)	0.214 (0.355)
MG	-----	-1.090** (-2.044)	-----
Adjusted R Square	0.430	0.370	0.550
N	84	84	84

Note. t statistics are in parentheses. \*\*\* means significant at 1% level of significance, \*\* means significant at 5% level of significance and \* means significant at 10% level of significance.



#### 5.7.4 Discussion on the Significant Variables

##### 5.7.4.1 Industry Median Average

Industry median average significantly positively affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. Bradley et al. (1984) showed that industry classification can explain 54 per cent of the variations in the debt ratio. There are two possible reasons for being the industry classification significant. Hovakimaian Hovakimaian and Tehranian (2004) argued that industry includes some omitted factors and hence become significant. The omitted factors may be industrial organization variables not included in other types of variables. Firms in the same industry face the same types of forces to set financing strategy hence has different debt level compare to firms in the other sectors (Frank & Goyal, 2009). The factor could reflect industry heterogeneity in terms of sales, assets, business risk, need of finance, range of products, opportunity to access to finance markets, seasonal needs, technology or regulation and competition etc. Another explanation is that firms set industry median leverage as firms' target leverage. If there are any deviation from the targets than firms move to the industry median leverage. Gilson (1997), Hull (1999), Hovakimian, Opler, and Titman (2001), Faccio and Masulis (2005), Flannery and Rangan (2006), Ross et al. (2012) presented and supported this argument.

##### 5.7.4.2 Size

Size negatively significantly affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. In Bangladesh for the sample in study, size represents proxy of information asymmetry and availability of internal funds. Firstly, size is a proxy for information asymmetry. Large size means large information to the outside investors, and less information asymmetry (Fama & Jensen, 1983) and low possibility of under-pricing of equity. As a result, larger firms can issue more equity to raise funds (Rajan & Zingales, 1995). Hence, size of the firm negatively affects leverage according to pecking order theory. Finally, the packing order theory (Myers & Majluf, 1984) argues that large or old firms can fulfil financing needs from internal sources. Hence a negative relationship is justified. Kester (1986), Kim and Sorensen (1986) and Titman-Wessels (1988) reported negative relationship.

##### 5.7.4.3 Tangibility

Tangibility and financial leverage may be negatively related for three reasons: (i) managers' propensity of consuming more perquisites compare to optimal consumption, (ii) presence of bulk unique assets and (iii) asymmetric information about the assets value. Firstly, Grossman and Hart (1982) argued that by adding debt in the capital structure, the consumption of perquisites can be reduced. Because adding debt as capital increases possibility of bankruptcy also. As a result, managers will not consume excess as they will lose their jobs, if the firms face bankruptcy. So, by adding more debts in the managers could be aligned. Secondly, Stakeholder co-investment theory predicts that firms having more unique assets have very specialized labour and add larger liquidation cost at liquidation time. So, firms having more unique assets should have lower financial leverage (Titman, 1984). In order to control unique assets those acquired and accumulated from discretionary expenses-selling, general and administrative expenses, and research and development expenses, should have lower debt. Finally, if asymmetric information is about fixed assets in place, financial leverage should be lower. Booth et al. (2001) and Huang and Song (2002) reported a negative relation between tangibility and leverage.

##### 5.7.4.4 Tax

Tax negatively significantly affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. Matheson (2006) supported the negative effect of tax on the leverage. The owner of the industries want to pay higher tax and use less amount of debts to become commercially important person (CIP) in the country.

##### 5.7.4.5 Non-Debt Tax Shield (NDTS)

NDTS positively significantly affects financial leverage defined by long-term debts to total assets. The company having higher NDTS, having higher collateral-able fixed assets. Because of having higher collateral-able fixed assets, the industry can use more debts. Hence, non-debt tax shield is positively related with the leverage. Downs (1993) presents evidence for the positive effect of NDTS on leverage. However, NDTS is insignificant in the case of short term debts and total debts.

##### 5.7.4.6 Uniqueness (R&D)

Uniqueness positively significantly affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. Uniqueness can positively affects the financial leverage

when uniqueness is explained by information asymmetry theory. Uniqueness is represented by research and development expenses. But investment in research and development expenses are like investment in intangible assets which are more sensitive on the way to adverse selection problem. Mazur (2007) and Wei (2014) supported the negative effect of uniqueness on the financial leverage.

#### 5.7.4.7 Dividend Pay-Out

Dividend pay-out negatively significantly affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. When company pays dividend to the shareholders, the available cash decreases in the hand of managers. Hence less amount of debt is used to decrease cash available in the hand of managers.

#### 5.7.4.8 Agency Cost

The largest shareholdings significantly negatively affects financial leverage defined by short-term debts to total assets and financial leverage defined by total debts to total assets. Agency theory (Jensen & Meckling, 1976; Jensen, 1986) argued that “the optimal structure of leverage and ownership may be used to minimize total agency costs”. Following the works of Jensen and Meckling and Jensen, it is accepted that the ownership structure has influence on the leverage. The conflict between the principal and agent can be minimized if the largest shareholder monitor the activities of the agent. Consequently, firms can use more equity if single shareholder holds the large proportion of the total shares. Hence largest percentage shareholder’s shareholding should affect the financial leverage be negatively. Leland and Pyle (1977) and Berger, Ofek and Yermack (1997) supports the negative relationship.

#### 5.7.4.9 Business Risk

Business risk negatively significantly affects financial leverage defined by total debts to total assets. Business risk is the possibility of being failed in the business. In this study, higher variability of return on assets is treated as the higher business risk and lower variability of return on assets is considered as the lower business risk. Business risk is negatively related with the financial leverage under trade-off theory.

#### 5.7.4.10 Macroeconomic Conditions

In the expansion phase, business grows up at a very good rate, industrial production goes up, employment goes up, stock prices goes up and corporate profitability goes up. During business expansion phase of business cycle, packing order theory predicts that firms can generate money for financing from internal sources. Consequently, expansion and financial leverage should be negatively related. However, bankruptcy cost theory predicts that bankruptcy cost for growth opportunities are high and hence leverage and macroeconomic growth should be negatively related.

#### 5.7.4.11 Uniqueness (SGA)

Selling, general and administrative expenses positive significantly effects short-term debts, and negative significantly effects long term-debts, and significant effects on the total debts.

### 6. Conclusion and Applications of the Study

This study reviews the important concepts and theories developed in corporate structure until till date in an aggregate manner and provided substantial empirical evidences on capital structure. The study shows that the leverage ratios are correlated, but book value based and market value based leverage ratios are not correlated, short-term loans are three times compare to long-term debts, firms are reluctant in paying tax and allotment in research and development expenses are insufficient.

In addition, size, tangibility, and agency cost negatively and selling, general and administrative expenses positively affect financial leverage defined by short-term debts to total assets. Tax, selling, general and administrative expenses, dividend payout, business risk, GDP growth and money growth negatively and non-debts tax shield and research and development expenses positive affect financial leverage defined by long-term debts to total assets. Tangibility, tax, dividend payout, and agency cost negatively and research and development expenses positively affect financial leverage defined by long-term debts to total assets. The human capital cost do not have any effect on any kind of financial leverage.

The factors and capital structure information can be used in insolvency prediction, credit risk analysis & macro finance, cost of capital and capital budgeting, corporate governance study and other areas of finance as below.

1) Financing, investment, dividend, and production policies are important in corporate governance study. Financing determines corporate governance structure which is an important factor in strategic decision making in

future. When corporation increases debt in the capital structure, the control status of firm shifts from internal to external control. This shift imposes covenants those limits the strategic choice of managers in future uncertain environment. Williamson (1988) argued that the greater use of equity capital in the capital structure requires more administrative measures in order to reduce opportunistic behavior of the manager.

2) Capital structure information, specifically, factors are useful for *predicting insolvency*. An insolvency prediction model based on capital structure factors can be an alternative to option pricing based model. By using the capital structure information and the factors data and logistic regression or discriminant analysis, an insolvency model can be formulated. If the assumptions of the discriminant analysis are not satisfied, logistic regression should be used in this regard. In addition to apply as an alternative model, capital structure based model can be applied to cross check with the option pricing model.

3) The capital structure theories, factors and information can be used in *credit risk analysis and macro finance decision making*. Capital structure information is important for investors to know the position of the firm in future in an unexpected position like recession. The financiers can look at the present level of the debts in the capital structure and compare with the target level of debts should be to finance the gap.

4) Capital structure information is compulsory for estimating *cost of capital and evaluating capital budgeting decision*. For an example, a project scheduled to be financed by equity and produced negative net present value can become a positive if the project if financed by debt partly or fully. 6.5 Capital structure information is useful for economic policy research and efficient cash flow management.

5) The determinants of capital structure determined in this study are used as control variables in the subsequent study conducted to test the effect of financial leverage on the Malmquist productivity index and its components, and to test the effect of Malmquist productivity index and its components on the financial leverage.

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