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The determinants of Capital structure of firms in Japan

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Abstract

This dissertation is going to study the determinants of capital structure of firms in Japan. As previous empirical researches, they all pointed out the factors in different countries. Therefore, it is going to carry out the empirical research in Japanese firms. The sample data used in this dissertation is from a panel data set of 193 non-financial companies in the NIKKIE 225 during the periods from 2003 to 2013. Firstly, it presents MM theory and two mainly modern theories which are the trade-off theory and the pecking order theory. According to these theories, it finds some factors from our sample data. Then, the one-way ANOVA approach is applied. The results from ANOVA approach show that the industry classification is one of the determinants of capital structure. Moreover, it has applied the fixed effects model for the sample data to find out the other determinants. The results show that non-debt tax shield, size, growth opportunity, tangible assets and profitability are considered as determinants of capital structure of Japanese firms. And the liquidity needs more argument due to the insignificant result. In general, it cannot have a convincing theory to explain the behaviour of financing capital structure of Japanese firms. The most likely theory to follow in Japanese firms is the trade-off theory. In fact, it can guess that dynamic trade-off theory might be the most appropriate. The answer for this theory should be considered in the further study.

Contents

1. Introduction

1.1 Background overview

As Richard, Myers and Franklin (2008) state, capital structure can be considered that a firm mixes the debt and equity to finance its fund. In order to raise finance from the market, it has to dilute ownership more than the firm would like to do. It means that it has to adjust the capital structure to its optimal level. This problem was considered as an important and notable issues in the past. The purpose for many studies is finding the optimal point of capital structure with mixing the debt and equity so that minimize the cost of financing capital structure. Moreover, many literatures also have studied what the determinants of the optimal debt equity combination.

The basic framework is developed by Modigliani and Miler (1958, 1963) in 1958 and 1963. They make assumption with the market as a perfect market. It means that it no transaction costs, no agency costs, no bankruptcy costs, no taxes and no private information in the market. In such assumption, they developed two main propositions. As Richard, Myers and Franklin summarize (2008), proposition one is saying that firm's value is not affected by leverage. Proposition two merely states that the return you can expect from equity goes up with debt to equity ratio and gives the relationship between the two. However, the basic framework has not discussed complex situation which the market has agency costs, cost of financial distress, taxes and private information. Hence, the further discussion for other researchers is going to find out the answer under real market.

The mainly theories of capital structure are the trade-off theory and the pecking order theory. Both of the theories are released the strict assumption in the market and discuss the optimal capital structure and find out what the determinants affect the capital structure. In the trade-off theory, it mainly discusses the relationship between agency cost and cost of financial distress and debt to equity ratio. The trade-off theory describes the optimal point of mixing the advantages of debt and cost of debt. However, Brealey, Myers and Allen (2008) argue the theory does not consider the stock market effect in debt equity ratio (Brealey R. A. et. al., 2008). Furthermore, the pecking order theory focused on asymmetric information more than cost of financial distress. This theory also considers how the agency cost affects the capital structure. In the pecking order theory, it assumes that firms prefer to retained earnings than external finance. Moreover, in external finance, firms prefer debt than equity. Both of the theories are discussed in previous research. And both of researches have pointed out how and what different determinants affect the capital structure under broad assumptions of the market.

In this study, the mainly discussion focuses on these two theories and find out the determinants factors of capital structure choice by using Japanese firms. Many previous empirical studies were studying the same topic by using different countries. Ozkan (2001) does his study by using UK company panel data. His investigation has provided an inside view of corporate borrowing from UK companies. The results show that the company has a target of debt ratio and they adjust their target very quickly according to the market. Moreover, Huang and Song (2005) do their research by using Chinese companies. It finds out some differences in determinants of capital structure because of the different market. They try to explain the different features in the capital structure of Chinese companies. The differences might be the different accounting principles and different behaviours from

the managers. Furthermore, Miguel and Pindado (2001) find new evidence of determinants of capital structure from Spanish panel data. They find out a different relationship between the determinants and leverage from Spanish companies. They explain the reason for differences according to the trade-off theory.

Therefore, this study is trying to discuss and find out some evidence from Japanese panel data following the former empirical researches. It is sensible to carry out the determinants of capital structure by using different countries' data because it can have new results and enlarge this important topic.

1.2 Research Objective

The object of this study is trying to find out the significant determinants of the Japanese firms by using a panel data. The panel data are from the NIKKIE 225 which is an index from Japan. The 225 numbers of companies can represent most of the companies and industries in Japan. The sample data is yearly accounting data from the first of January in 2003 to the first of January in 2013 which includes 10 years. Hence, it is believable that the sample data can be represented for all the companies in Japan. To be more specific, the objects can be described as three mainly points,

Firstly, what are the significant determinants in Japanese companies?

Secondly, how do the determinants affect the capital structure?

Thirdly, which theories is the most appropriate in explaining the capital structure of Japanese firm?

In order to answer these three problems, this study is going to present the basic theories and do empirical research for Japanese panel data. Moreover, it is trying to explain the determinants according to different theories. Finally, it can find out the appropriate theory to explain the financial behaviour of Japanese corporations.

1.3 The structure of dissertation

This dissertation is organized as follows. In chapter 2, it is going to review the previous theories of capital structure, which are included the Modigliani and Miller irrelevance theory, the trade-off theory and the pecking order theory. Chapter 3 provides some factors discussed before and moreover, it is to identify the factors of capital structure in this study according to different theories. Chapter 4 presents the data collected for this study and the empirical methodology according to previous studies and financial Econometrics. Chapter 5 is about the results from the methodology and having some discussion about the estimated resulted. Finally, in Chapter 6, it has a conclusion and furthermore, it presents some limitations in order to have a further discussion in the future.

2. Literature review

2.1 Modigliani-Miler theorem

Richard, Myers and Franklin (2008) summarize that Modigliani-Miler theorem is a starting point and provides a framework to do research in the capital structure. Two propositions are present in the theory by Modigliani and Miler in the 1958 which shows the payout policy does not matter in the prefect markets, also shows that financial decisions do not matter in prefect markets, too (Richard A. B. et. al, 2008). In other words, Modigliani-Miler theory (MM theory) considers that with fixed investment decisions, it is irrelevant with the capital structure of a firm. In the previous empirical works of MM theory, all the researches were under some strict assumptions. In William, Scott and Lawrence's (2007) study, the assumptions can conclude as two big points. The first one is the cash flow is perpetual; it means that it is zero growth opportunities. The second one is prefect market which is no taxes, no transaction costs, perfect competition in the market, and the same rate for the firms and investors borrow/lend and equal access to all relevant information.

In the next section, it is going to discuss the MM theory in two conditions. In the early beginning, Modigliani and Miler considered the financing of capital structure was without taxes. However, in the later time, they argued that the financing of capital structure was with taxes. Therefore, it is necessary to discuss the MM theory in two conditions.

2.1.1 Modigliani-Miler theorem without taxes

2.1.1.1 Proposition 1:

Modigliani-Miler theorem without taxes is basic and original framework provided by Modigliani and Miler. Under the assumptions of MM theory, the investors can duplicate the earning of firm under any capital structure. It means that investors can find the capital structure with any leverage finance. Therefore, it cannot create extra value for the shareholders with adopting a particular capital structure. As William (200&) summarize, proposition one asserts that under perfect market, the total market value of a firm is equal to the value of its assets and the firm value is not affected by leverage. Moreover, the value of its assets is measured by the present value of the cash flows generated by the assets (William L. M. et. al.: 2007). Ross, Westerfield and Jaffe (2008) conclude the proposition one into one simple and straightforward equation, which is

$$V_L=V_U.$$

It means that the market value of a leveraged firm which is standing for V_L it the same with the market value of an unleveraged firm which is V_U in the equation.

The basic behaviour of a firm whenever they would issue equity or debt is borrowing a fund from the market or selling an ownership to market. In the light of perfect market, the firm does not enjoy any counter-advantage comparing with an individual when the firm is undertaking leverage. The reason is both of the firm and individuals can borrow or lend at the same rate from market (Richard A. B. et. al, 2008). It means that it is no arbitrage opportunities in the transactions. Therefore, it is no additional value of

issuing debt or selling equity.

As proposition one has been discussed before, the key point it can emphasize is that under the assumptions, whether a company use a leverage or not will not impact the total market value. In other words, it is no matter for the value of firm with any financial assets with debt and equity (Fischer E. et. al, 1989, Richard A. B. et. al, 2008, William L. M. et. al, 2007)

2.1.1.2 Proposition 2:

Modigliani and Miler established in proposition one that a firm's debt-equity ratio is irrelevant to its market value. Moreover, they further considered the choice about the debt-equity ratio. It is what we are known in proposition two. As William, Scott and Lawrence (2007) explain in 2007, the proposition two states that the use of financial leverage increases the risk and return to shareholders. In the literature written by Jonathan and Peter (2011), they conclude the proposition two as "the cost of capital of levered equity increases with the firm's market value debt-equity ratio". Considered the firm as a portfolio combined debt with equity, the return on the assets of firms is equal to the weighted average of the returns on debt and equity. It is known as follows,

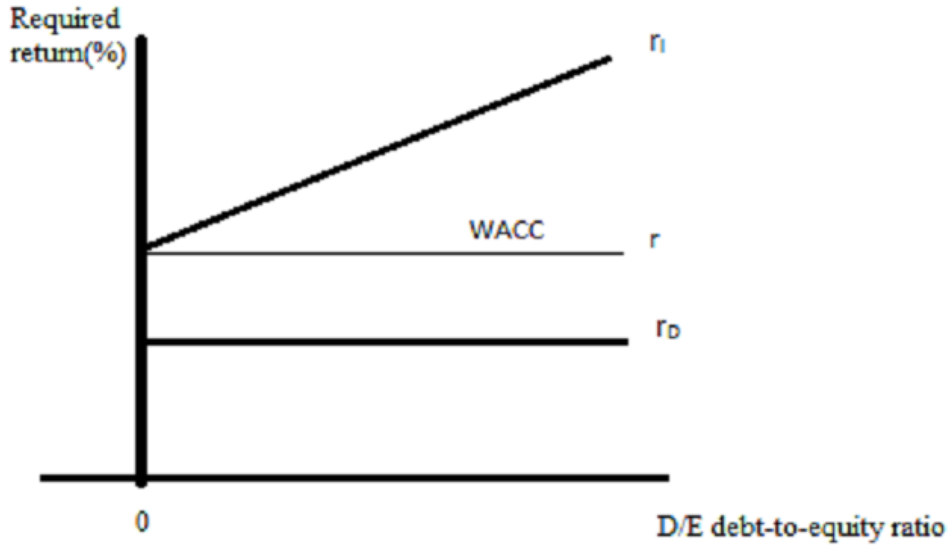
$$r_U=(\frac{E}{V})r_E+(\frac{D}{V})r_D$$

Rearranging the above equation, it can get,

$$r_E= r_u +(\frac{D}{E})(r_u- r_D)$$

Where are means the return on levered equity, r_u is the return on unlevered equity, D stands for the value of debt, E is the value of equity, r_D is the cost of debt.

In the equation, it implies that the return on equity is equal to the return on assets. Moreover, as debt is increasing, the return on equity is increasing as well. When a firm replaces debts for equity, it is obvious that it is replacing a high cost source of finance with a low cost one by holding more risks. In other words, leverage increases the risk and return to shareholders even though the cost of debt is less than the cost of capital. However, it is no net benefit for a firm to do this because the rate at which the cost of equity increases exactly offsets the decrease in the cost of funds for replacing equity with debt and WACC will be held the same as before. The proposition two is merely stating the return which can expect from equity goes up with the debt-equity ratio, and provides a relationship between the two (Seth A.: 2005). The proposition two, which is that the rising cost of equity accompanies a higher debt-equity ratio and leaves a firm's WACC unchanged, can be shown as graph 1 below,



GARPY 1: MM proposition two Illustrated (William L. M. et. al., 2007)

2.1.2 Modigliani-Miler theorem with taxes

Modigliani and Miler (1958) derived the propositions under the assumptions that it is no taxes or other transition costs. However, Modigliani and Miler

(1963) introduce an important factor, taxes, into their theory. They released the assumptions about taxes and discussed how the taxes would impact the capital structure. In the world of taxes, corporations can treat interest payments to lenders as a tax deductible business expense whereas the shareholders do not have such advantage with dividend payment. Obviously, it leads benefits from debt because of the tax advantage. In other words, firms can issue debt so that it can increase the value of the firm.

Reminding the proposition 1 in MM theory without taxes, it is known that $V_L=V_U$. Considering in an unleveraged firm, it can modify V_U with discount after tax income. Supposed T_C is the tax rate, r_D is the cost of debt, it can get the taxable income is EBIT- r_DD.

By issuing debt to market, a firm can shield some of its cash flow from taxation. Therefore, it can increase the value of the firm. The tax shield can be treated as followed,

$$\text{PV of interest of tax shield} = \frac{(T_c \times r_D \times D)}{r_D}$$

In other words, the advantage of debt is the tax rate times the face value of debt outstanding. Therefore, the value of leveraged firm is equal to the value of an unleveraged firm plus the PV of interest of the tax shield. It can express as,

$$V_L=V_U+\text{PV tax shield}$$

It should know that the V_L and V_U is the value of leveraged and unleveraged firm with tax

In conclusion of the MM theory with taxes, Ross (2008) points out that 100% debt financing of projects is optimal, In other words, a firm's optimal capital structure is 100% debt (Ross et. al., 2008). However, it is an unrealistic conclusion of the Modigliani - miller theorem with taxes. Modigliani-Miler

theorem contributes a basic point and framework to do research in capital structure. However, the theory ignored some of the important factors, for example, agency cost, bankruptcy cost and so on, in the real world under its strict assumptions (Breasley et. al., 2006). Murray and Vidhan (2007) argue that a number of important facts are not identified in MM theory. It is important to advocate taxes, bankruptcy costs, transaction costs, adverse selection and agency conflicts as major explanations for the corporate use of debt financing (Murray Z. F., 2007). These ideas are synthesized into trade-off theory and pecking order theory.

2.2 Trade-off theory

When the corporate income tax was introduced to the original irrelevant propositions, this creates a benefit of leverage from the interest tax shield with the costs of financial distress. It is to determine the amount of debt to issue so that a firm should maximize its value. The financial distress is an important fact to avoid unrealistic 100% debt financing, which is an offsetting cost of debt it needed. As Kraus and Litzenberger (1973) state, it has a classic statement of the theory that optimal leverage reflects a trade-off theory between the tax shield and deadweight costs of bankruptcy (Kraus A. et. al., 1973). According to trade-off theory, Myers (1984) explains the debt equity ratio target that is set by a firm which followed trade-off theory is determined by balancing debt tax shields against the costs of bankruptcy. More details, it said that the total value of a leveraged firm equals the value of the unleveraged firm plus the present value of the tax shield from debt and less the present value of financial distress costs (Myers S. C., 1984). It can simply express as follows,

$$V_L = V_U + \text{PV tax shield} - \text{PV financial distress costs}$$

It is obviously known from the above equation that leverage has costs as well as benefit. In order to exploit the benefit of the tax shield, the firm has motivation to increase leverage. However, the more debt the firms adopt, the more risk they should bear. In the view of Jonathan (2011), with too much debt, they are more likely to default risk and incur financial distress costs (Jonathan B. et. al., 2011).

2.2.1 Tax shields

Under the discussion of MM theory, higher debt and interest payment can have less tax in a world tax system. In general, the interest that corporations need to pay can be considered as a tax deductible expense so that it can increase the firm's value (Stein F.). As Graham (2003) contributes, Miller points out although firms have an incentive to borrow since they have a corporate tax advantage, an individual may not find it is optimal to lend to the firm (Graham J., 2003). Therefore, it has a conflict between personal tax and corporate tax. This is because interest income and dividends/capital gains are taxed at different rates. The interest income is taxed at a regular income tax rate whereas dividends/capital gains often tax exempt or at a lower tax rate. It means that individuals in higher tax brackets would perfect equity to debt.

In the view of firms, it would borrow as much as possible from low income tax groups in order to have a tax shield whereas individuals would ask for higher interest to compensate the higher personal tax groups they are in. Thus, it would reduce the tax shield of firm and lead to a limitation of using debt. In conclusion, it has a positive relation between using debt and corporate tax while negative relation with personal tax.

The main theoretical benefit of debt is a tax shield on interest paid on debt (Scott J. M., 1976). Some investigators provided many examples to illustrate the tax shield on interest paid on debt in many tax systems in the world. As stated by Ashton (1989), the tax system in the USA encourages firms to report losses for the accounting year forward so that firms have ability to receive cash refund of prior taxes or get tax reduction in the future (Ashton D. J., 1989). However, in the UK, Adedeji (1988) points out that those firms in the UK do not use debt as much as firms in the USA because of the imputation tax system (Adedeji A., 1998). In other words, it has benefits on tax shield on interest paid on debt but with a different tax system in the world, firms in different countries finance their capital structure with different leverage. Although it has the main theoretical benefit of debt which is tax shield, it also has the main adverse consequence which is the cost of financial distress (Scott J. M., 1976).

2.2.2 Financial distress cost

2.2.2.1 Bankruptcy cost

As companies have more debt, the size of the debt obligations is growing. In case the firm is not able to meet its debt obligations, the company is facing financial distress or declares bankruptcy. It is one of the main adverse factors in financial distress cost. Myers (1984) states that for a given level of operating income, the higher the level of debt the firms have, the higher chance that the firm is unable to meet the obligation. Therefore, while debt may have a net advantage, managers have to trade-off this tax advantage against the present value of the expected cost of bankruptcy cost (Myers S. C., 1984). Obviously, the bankruptcy cost is one of the candidates which are

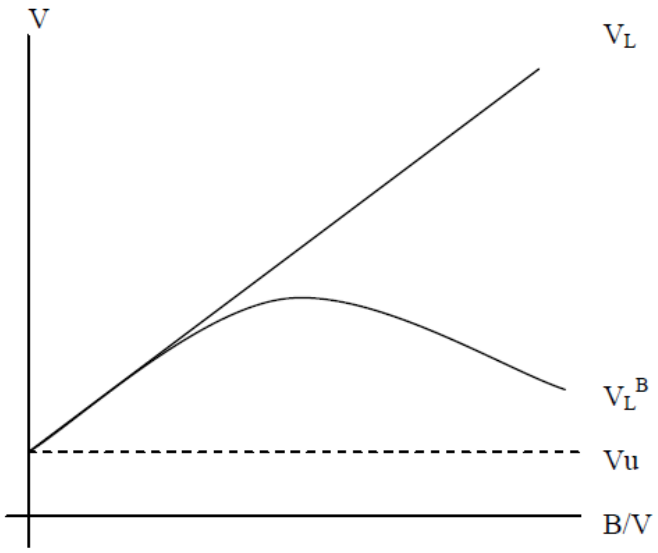
offsetting the cost of debt. According to Kraus and Litzenberger (1973), they provide a classic statement of the theory that optimal leverage reflects a trade-off between the tax shield of debt and the deadweight costs of bankruptcy (Kraus A. et. al., 1973). Since the Myers' statement, it can express a levered firm's value as follows,

$$V_L=V_U+\text{PV tax shield-PV bankruptcy costs}$$

It is well known that bankruptcy costs include direct and indirect costs of bankruptcy (Warner J. B., 1977, William L. M. et. al., 2007, Barclay M. J. et. al., 2006). Taking William et. al.'s (2007) explanation for example, direct costs of bankruptcy are out-of-pocket cash expenses directly related to the bankruptcy filing and administration, like legal and administrative are the costs of the bankruptcy process. Indirect costs are expenses that result from bankruptcy but are not a cash expense spent on the process itself, like loss of income to the firm because of loss of confidence by consumers (William L. M. et. al., 2007). Many studies show how both the direct bankruptcy cost and the indirect bankruptcy cost affected the capital structure. In the view of direct bankruptcy cost, Warner's (1977) empirical research shows that large firm would have the motivation to use debt. Relative to the pre-bankruptcy market value of a large firm, large firms would have small expected direct bankruptcy cost (Warner J. B., 1977). In addition, although indirect bankruptcy cost is hard to measure, research showed they are significant.

Many studies show that firms use less debt when they are facing a higher expected bankruptcy risk (Myers S. C., 1984, Brealey R. A. et. al., 2008, William L. M. et. al., 2007). Firstly, companies with highly variable earnings use less debt while firms with more stable profits have tended to use more debt. Second, the observed leverage ratios across industries are highly correlated to investment opportunities of industries. Generally speaking, if firms with capital invest have few growth opportunities, they tend to have a

high levered ratio. On the other hand, if firms with high-tech have many growth opportunities, they motivate to use less debt. Third, firms will use more debt if their assets can go through bankruptcy without losing value (William L. M. et. al., 2007). If only considered the bankruptcy cost in capital structure, it can be illustrated in the graph 2 below,



GRAPH 2: Capital structure with bankruptcy cost in trade-off theory (Sanjay B., 2013)

As a tax shield on the debt cannot fulfil with the bankruptcy cost, the firm stops borrowing where the value is maximized.

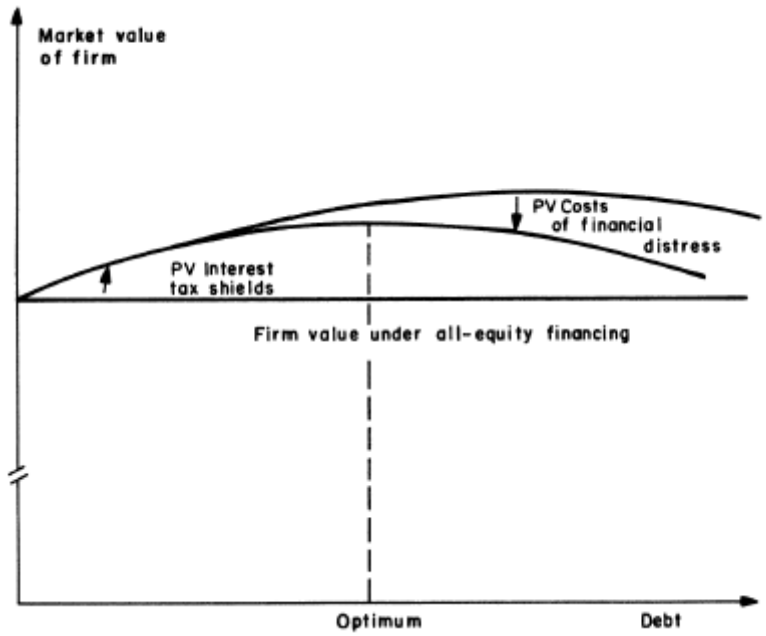
2.2.2.2 Agency cost

Michael and William (1976) present the agency cost of the financial structure. As they observed, when an entrepreneur owns all of a company's stock, the entrepreneur bears all the costs and reaps all the benefits (Michael J. et. al., 1976). However, selling stock to outside investors creates agency costs of equity that the entrepreneur bears and also harms society and discourages additional entrepreneurship. Even though selling stock has

such disadvantage, it is essential for entrepreneurs to sell external equity in society. Firms pursue growth opportunities and expand the entrepreneur's personal wealth (William L. M. et. al., 2007). Michael and William (1976) point out that debt can overcome the agency cost of outside equity. However, it also leads to agency cost of debt (Michael J. et. al., 1976). In the model of Michael and William (1976), starting from an all equity position, managers will sell bonds for stock to reduce the agency costs of equity. As long as reducing agency costs of equity, the agency costs of debt are increasing. In other words, if it meets a balance between the agency cost of equity and agency cost of debt, capital structure could be optimal. Considered in trade-off theory, now it can express a levered firm's value as an unlevered firm's value minus present value of bankruptcy plus agency cost of equity minus agency cost of debt. It can be simply expressed as follows (Jonathan B. et. al., 2011),

$V_L=V_U$+PV tax shield-PV bankruptcy costs+PV agency cost of equity-PV agency cost of debt

According to the above equation, the optimal capital structure can describe as follows graph 3,



GRAPH 3: Optimal capital structure in trade-off theory (Myers S., 1984)

As Hayne's study (1998), the optimal structure is different vary with the characteristics of the firm. For example, firm with high research and development and more growth opportunities commonly maintain low debt levels. In order to have low current cash flows, they need little debt to provide a tax shield. Moreover, the agency cost of debt is high. Thus, firms such as biotechnology and technology often have low leverage (Hayne E. L., 1998). In general, debt offers tax advantages so that it reduces the cost of issuing debt. However, as long as issuing debt, the bankruptcy cost is increasing. It has a bias impact towards equity. Besides, equity is not free and it is associated with agency cost. Hence, optimal capital structure has three determinants which are tax shield, bankruptcy cost and agency cost.

2.2.3 Limitation of trade-off theory

Although the trade-off theory successfully explains the differences in capital structure among different industries, there are still a few unexplained regularities cannot explain. Some studies found in the highest profitability

companies have lower debt whereas in the trade-off theory, it suggested that it was a positive relationship between profitability and leverage (Ross S. A. et. al., 1977, Kester C. W., 1986). Moreover, in the trade-off theory, it implied that firms have motivations to use too little debt. However, for example in the leverage increasing event, the leverage increase such as debt-for-equity exchange offer, it will always increase the stock price. It seems that firms will use more debt against the trade-off theory (William L. M. et. al., 2007). Mayer (1984) proposes a new theory to illustrate these regularities which is known as pecking order theory (Mayer S. C., 1984).

2.3 Pecking order theory

Compared with the trade-off theory, Mayer proposed the pecking order theory. As Myers' explanation (1984), "a firm is said to follow a pecking order if it prefers internal to external financing and debt to equity if external financing is used (Mayer S. C., 1984). In other words, it is argued that adverse selection implied that retained earnings are better than debt and debt is better than equity. This ranking was also motivated with reference to the adverse selection model in Myers and Majluf (1984). They provide a definition which is that a firm is said to follow a pecking order if it prefer internal to external financing and debt to equity if external financing is used (Mayer S. C. et. al., 1984). Most firms hold some internal funds such as cash or short term investments even they still raise their funds from outside. It is obvious that companies can be considered as follows pecking order. The pecking order theory is relaxed the assumptions of MM theory and trying to develop to explain the optimal capital structure in the modern organization system. The pecking order model can be derived based on adverse selection considerations and agency considerations. Hence, it is going to discuss pecking order theory in two parties which are adverse selection and agency

cost. As concluded by Murray and Vidhan (2007), the theory suggests that less profitable companies tend to have higher leverage against the trade-off theory. Moreover, the pecking order model argued that firms would favour internally generated funds to external finance when financing a prospective investment (Murray Z. F. et. al., 2007).

2.3.1 Adverse selection

The most common motivation for the pecking order is adverse selection developed by Myers and Majluf (Myers S. C. et. al., 1984). The adverse selection is referred to as asymmetric information which means that the sellers have more information than the buyers. Since adverse selection, when a seller has private information about the value of a good, buyers will discount the price they are willing to pay. According to Myers et. al.(1984), they made two assumptions based on adverse selection about managers. One is managers knowing more about the current earnings of firms and investment opportunities than outside investors. The information is considered as asymmetric information. The key performance is that the owner-manager of the firm knows the true value of the firm's assets and growth opportunities. Outsider investor can only guess these values. The other is that manager acts in existing shareholders' interest. In conclusion, manager follows the pecking order theory (Jonathan B. B. et. al., 1999). In practice, Majuf and Myers (1984) explains if the manager offers to sell equity outside, the outside investors must ask why is willing to sell equity. In many cases the manager of an overvalue firm will be happy to sell equity in order to get a higher value from outside, vice versa (Myers S. et. al., 1984).

Because managers find that it costs much more to issue equity that is underpriced, they tend to seek other forms of financing. According to

Jonathan et. al.(2011), compared with equity financing, although debt issues also may suffer from adverse selection, debt value has lower risk and is not sensitive to manager's private information. It means the degree of under pricing will tend to be smaller for debt than for equity. By avoiding under pricing, firm tend to finance their investment using its retained earnings when it is possible (Jonathan B. et. al., 2011). Thus, Jonathan et. al.(2011) conclude that "managers who perceive the firm's equity is underpriced will have a preference to fund investment using retained earnings, or debt, rather than equity (Jonathan B. et. al., 2011)".

2.3.2 Agency cost

In the traditional view, the argument was that managers had to explain the project detail to outside investor when using outside financing. It makes the manager expose themselves to investor monitoring. However, managers would not like to be monitored so that they prefer internal financing over external financing. Jensen and Meckling (1976) provide an agency theory to contribute this idea which is whether use debt or equity when external financing (Jensen M. C., 1976). According to Myers' study (2003), he states that agency costs of equity will imply a financial hierarchy so that it could result in a pecking order (Myers S. C., 2003).

From the point of Myers' and Majluf's (1984) view, suppose there are three sources for firms to finance their capital, which are retained earnings, debt and equity. Retained earnings are subject to have an adverse selection problem whereas debt has a less adverse selection problem (Myers S. C. et. al., 1984). In the light of outside investor, equity is more risky than debt. Moreover, both of the two have adverse selection problems but equity has more than debt. Hence, the outside investor would prefer a higher rate of

return on equity than debt. Considered the view of firms, firms would like to finance their project firstly with retained earnings. Then, consider financing with the debt source. The last source they would use is equity (Murray Z. F. et. al., 2003). Therefore, it has a pecking order.

In the pecking order theory, there is no well defined debt-equity ratio because it has internal and external equity. The pecking order theory explains why the most profitable firms would like to borrow less because they do not need outside financing. In other words, less profitable firms would issue debt since they have not got enough internal earnings whereas more profitable firms can finance their project without external earnings. Moreover, the advantage of tax shield is considered as second order in the pecking order. Richard, Stewart and Franklin (2008) state that debt ratio changes when there is an imbalance of internal cash flow, net of dividends and investment opportunities (Richard A. B. et. al., 2008). Even in a highly profitable firm, they would like to keep their leverage low when they have limited investment opportunities. Firms with sufficient investment opportunities generated fund are driven to borrow debt as more as they can. Furthermore, the theory also explains the inverse intra industry relationship between profitability and leverage provided by Kester and Titman and Wessel (Kester C. W., 1986, Titman S. et. al., 1988). They argue that given dividend payout policy, the least profitable firms will have less internal funds and tend to stop borrowing more. The reason is if a firm invests generally in order to catch up with growth in their industry, the rate of investment would likely be the same within an industry. Hence, highly profitable firms tend to borrow less while firms with low profitability will borrow more.

3. Determinants

In this section, it is going to present many empirical researches about the factors suggested by different theories of capital structure. Many empirical works have unearthed some stylized factors on capital structure choice, largely based on firms in the United States (Rajan R. et. al., 1995). It can use some factors such as non-debt tax shields, bankruptcy costs, industry effects, tangible asset, the firm's size and profitability suggested by Srein (Srein F.). Furthermore, it will state how to measure these factors in a quantitative way.

3.1 Non-debt Tax shields

As a model derived by DeAngelo and Masulis (1980), the model considered that the optimal capital structure was impacted by corporate taxes, personal taxes and non-debt tax shields (DeAngelo H. et. al., 1980). The non-debt tax shield is defined as a tax advantage related to corporate tax. They argued that firms with tax deductions for depreciation, carry forwarded tax loss and investment tax credits have tax benefits of debt financing. In other words, if firms can get large non debt tax shield from tax deductions, carry forwarded tax loss and investment tax credits, they would prefer for financing with less debt in their capital structure. Both trade-off theory and pecking order theory are supported with DeAngelo and Masulis (1980). As the model concluded, it has a negative relationship between leverage and the non-debt tax shield (DeAngelo H. et. al., 1980). In trade-off theory and pecking order theory, Ross (1977) explains his view to support the negative relationship (Ross S., 1977). Firms with non debt shields may suffer tax problem when they have over leverage if they are not able to fulfil all their possible tax shield. Then, debt will become a burden for firms. Therefore, higher amount

of non-debt tax shield firms have, lower amount of debt will be used for financing capital structure.

On the other hand, in the pecking order theory, others argued in a different relationship against the trade-off theory, such as Scott, Moore and so on. Scott and Moore (1977) argue that debt is less risky than equity (Scott J., 1977, Moore T. W., 1986). It is one of the reasons why debt prefers than equity. Compared with non-debt tax shield, the advantage of debt may deadweight the non-debt tax shield. Hence, Scott (1977) and Moore (1986) also hypothesize a positive relationship between leverage and non-debt tax shields. In conclusion, it is not convinced of the relationship between leverage and non-debt tax shields supported by Bradley et. al., Titman (Bradley M. et. al., 1982; Titman, S., 1984).

As Titman and Wessels' (1988) view, indicator of non-debt tax shield can express as the ratios of investment tax credits over total assets or depreciation over total assets (Titman S. et. al. 1988). And Bradley et. al. (1982) express the indicator as the ratio of depreciation expense to total assets (Bradley M. et. al., 1982). The study here will choose the ratio of depreciation expense to total assets as an indicator of non-debt tax shield.

3.2 Size

Some evidences were provided that it has a relationship between size and leverage. As evidences from Warner (1977) and Ang, Chua, and McConnell (1985), they suggest that when firms are suffering from bankruptcy, large size firms seem to have more capacities to suffer from direct bankruptcy costs than small size firms (Warner J., 1977, Ang C. K. et. al., 1985). Furthermore, large size firms tend to well diversified so that they have less

risk of bankruptcy. In other words, large size firms have more motivations to borrow debt. In conclusion, it suggests that there exists a positive relationship between size and leverage supported the trade-off theory.

On the contrary, Smith (1977) argues that the cost of issuing debt is related to the firm's size (Smith C., 1977). Small size firms cost much to issue equity so that they tend to finance their capital structure with debt. In other words, the large size firm will tend to use retained earning while small size firms tend to borrow debt. It suggests that it has a negative relationship between size and leverage in pecking order theory. Moreover, Rajan and Zingale (1995) prove their point to support the relationship. Large firms have lower cost of asymmetries information between inside owners and outside investors. Thus, large size firms should have lower leverage because they are easy to issue equity with lower cost of asymmetries information (Rajan R. G., 1995). Therefore, in pecking order theory, it suggests that it has a negative relationship between size and leverage. The indicator of size can express as the logarithm of sales or quit rates (Titman S. et. al., 1988). In this study, it will express the size as the logarithm of sales.

3.3 Growth opportunity

Growth opportunity is identified in many empirical works and different relationships between leverage and growth opportunity are presented. The first point argued is that growth opportunity affected the relation between managers and shareholders which cause agency cost. In trade-off theory, Lang, Ofek, and StulZ (1996) argue that it has a negative relationship between leverage and growth opportunity (Lang L. E. et. al., 1996). They find that firms with good growth opportunity and few agency problems will have a significant negative relationship between debt and growth

opportunity. That is supported by Jensen and Meckling (1975), Smith and Warner (1979), and Green (1984) (Jensen M. et. al., 1975, Smith C. 1977, Warner, J., 1979, Green R., 1984). They summarize that the agency cost will reduce when issuing convertible debt. Myers (1977) notes that it is a more significant positive relationship between short-term debt and growth opportunity (Myers S., 1977). He argues it has less agency problems between managers and shareholders when issuing short-term debt.

On the other hand, the second point argued is that growth opportunity cannot create generate current taxable income so that shareholders are worried about this investment. However, investment can add to the value of firms and managers would like to do it. For this argument, Titman and Wessels (1988) state that it has a positive relationship between debt and growth opportunity (Titman S. et. al., 1988). Moreover, if a firm cannot raise enough finance with retained earnings for a good investment, they prefer debt than equity according to pecking order. Frank and Goyal (2009) put forth a firm with good investment opportunity would have motivation to finance with debt (Frank Z. et. al., 2009). In other words, they present a positive relationship between debt and growth opportunity.

Indicators of growth are expressly as capital expenditures over total assets (Titman S. et. al., 1988), or market-to-book ratio (Barclay M. L. et.al, 1996). Also, some used RD/S which means research and development over sales. In this study, it is going to follow Titman's equation, which is capital expenditures over total assets.

3.4 Tangible assets

In most empirical research, they thought about that the type of assets would

affect the capital structure. Firstly, Jensen and Meckling (1976) argue that it is positive relationship between tangible asset and leverage in the light of agency cost (Jensen M. et. al., 1976). It is supported by Scott (1972), Myers and Majuf's (1984) research. They suggest that the firm would have the advantage of tangible assets. More generally, supposed a firm shifts to riskier investment after insurance of debt or transfer wealth from creditors to shareholders, hence, the firm will have an agency cost of debt. And firms which have high tangible assets can overcome the lender's risk of suffering such agency cost (Scott J., 1972, Myers S. et. al., 1984). In other words, firms have high tangible assets can overcome such agency cost of debt even though they are issuing more debt. Firms rich in tangible asset will tend to have more debt. Hence, high tangible assets are expected to have a high leverage. However, others argued in opposite relationship between tangible assets and leverage. As Grossman and Hart's (1982) view, in the light of bankruptcy cost, they point out the tendency of consuming debt will be diminished because of the fear of bankruptcy (Grossman et. al., 1982). Managers are exposing themselves to bondholders in highly leveraged firms. It means that bondholders monitor managers closely and that will generate an agency cost. The agency cost may be higher so that the tangible asset cannot remove the all of the agency cost. Therefore, it exists a bankruptcy cost in a firm with highly leveraged. In conclusion, the trade-off theory has a mixed relationship between tangible assets and leverage.

Moreover, in pecking order theory, Myers and Majluf (1984) also argue that managers will have more information than outside investors. The cost of issuing debt with known value will avoid the asymmetric information costs (Myers S. et. al., 1984). For this reason, the firms will issue more debt to take advantage of this opportunity. In other words, pecking order theory suggested that it has the same relationship as the one suggested by the trade-off theory. The indicators of tangible asset have two main equations.

One is the ratio of intangible assets to total asset put forth by Titman and Wessels (Titman S. et. al., 1988). The other is the ratio of property, plant and equipment to total assets presented by Friend and Lang (Friend I. et. al., 1988). In this study, it will use the ratio followed by Friend and Lang, which is property, plant and equipment to total assets.

3.5 Liquidity

In Ozkan's (2001) empirical research, he argued that liquidity has a mixed impact on the capital structure decision (Ozkan A, 2001). Liquidity ratio means how the ability of companies can repay the loan to creditors. In other words, it can be considered as potential risk of firms. Firms with high liquidity ratio have motivation to borrow more debt because they have the capacity to repay the loan. In the view of trade-off theory, Ozkan (2001) suggests that firms with high liquidity can support a relative leverage as they are possible to meet the loan repayment. The firms with high liquidity may have less bankruptcy risk. It means that they are not suffering much bankruptcy costs. Moreover, Pano (2003) argues in the light of the free cash flow problem. Considered the free cash flow of a firm, the firms have high liquidity means that they also have higher free cash flow. In order to limited managers who may have tended to use available cash, the shareholders would like to use more debt (Pano A., 2003). This suggests a positive relationship between liquidity and leverage.

On the other side, firms with high liquidity can fund their investments with their own finance without raising external finance. In the pecking order theory, that the firm prefers internal finance to external finance suggests it is following the pecking order. Therefore, Ozkan (2001) states that the liquidity position of firms should imply a negative relationship with its

leverage (Ozkan A., 2001). In addition, Prowse (1991) argues in the view of agency cost to support the negative relationship. Prowse claimed the liquidity of company's assets can be explained the extent to which these assets can be manipulated by shareholders at the expense of bondholders (Prowse S. D., 1991). In conclusion, it has a negative relationship between liquidity and leverage in the light of pecking order. The indicator of liquidity will mainly be express following Zokan's study, which is the ratio of current assets to current liability (Ozkan A, 2001).

3.6 Profitability

Many empirical researches provided evidences that profitability is a very important factor in capital structure. It has a conflict relationship between profitability and leverage in the two theories. Ross (1977) suggests that the trade-off theory predicted that the high profitability firm should have more debt in order to offset the corporate tax (Ross S., 1977). One of the points argued in trade-off theory is a tax shield explained by Modigliani and Myers (1958). They think that the most motivation to use debt is a tax shield (Modigliani F. et. al., 1958). And in order to get the tax shield, firms need to be profitable. Firms would tend to issue more debt to invest the projects so that they can enlarge their production. In other words, firms with higher profitability would tend to issue more debt and less profitability firms would issue less debt. The other point argued in trade-off theory is free cash flow by Jensen. Jensen claimed that in order to fund their investment, they have to finance their capital structure outside. However, lower amount of the cash flow they have, the riskier they issue a large amount of debt (Jensen M., 1976). Hence, it is to predict a positive relationship between profitability and leverage.

On the opposite side, Myers and Majluf (1984) argue it has a negative relationship between profitability and leverage since the pecking order hypothesis (Myers S. et. al., 1984). Stein points out that the pecking order theory suggests that firms prefer retained earnings because they are less costly type of financing than debt or equity (Stein F.). Hence, if firms are highly profitable, they would have enough retained earnings to invest so that they will not issue debt. In other words, it suggests a negative relationship. Moreover, Myers and Majluf (1984) also discuss debt issuing or equity could have costs because of asymmetric information problem (Myers S. et. al., 1984). In order to avoid these costs, firms with highly profitability could raise their funds with own retained earnings. Hence, the amount of retained earnings can be an important factor in capital structure. And as Titman and Wessel and Fama and French show that the profits and leverage have a negative correlation (Titman S. et. al., 1988, Fama E. et. al., 2002). The indicators of profitability can be expressed as a ratio of operating income over sales (Titman et. al., 1988) or ratio of tax over total assets (Booth et. al., 2001). In this study, it will use operating income over total asset, which put forth by Ranjan and Zingales, and Ozken (Ranjan R. G., 1995, Ozken A., 2001).

3.7 Industry classification

Rajan and Zingales (1995) observe the industry characteristics are one of the determinants of capital structure which they had extended this determination with cross-country comparisons (Rajan R. G. et. al., 1995). Since the type of assets, the risk of asset and the requirement of external fund for a firm is vary from different industries, Myers and Haris and Raviv (1991) suggest that it had a different leverage level from industry to

industry (Myers S., 1984, Haris M. et. al., 1991). William et. al. (2007) summarize the studies as followed. Industries such as banking, electric power generation, transportation, and telecommunications have higher debt ratios than others (William L. M. et. al., 2007). The reason for higher debt ratios is relative to the ability of profitability. Firms with higher profitability tend to issue more debt as suggesting by trade-off theory. In addition, investors trust good industry characteristics because the government will not allow these firms to bankrupt (William L. M. et. al., 2007). Hence, it suggested a positive relationship in such industry.

However, Titman (1984) suggests that firms that make products will require availability cash as more because he found liquidation especially costly (Titman S., 1984). It means that firms manufacturing machines and equipment should be less debt in the light of pecking order. The firms prefer internal finance than external finance to avoid the cost of debt. In other word, it has a negative relationship.

In conclusion, it can show all the differences between trade-off theory and the pecking order theory in determinants as follows according to previous empirical researches.

Variables	Definitions	Trade-off theory	The pecking order theory	Evidences
Non-debt tax shields (NDTS)	Depreciation expense/total assets	-	N/A	-: DeAngelo H. et. al., 1980 Ross S., 1977 etc N/A: Bradley M. et. al., 1982; Titman, S., 1984 etc
Size(SIZE)	logarithm of sales	+	-	+: Warner J., 1977, Ang C. K. et. al., 1985 etc -: Smith C., 1977 Rajan R. G., 1995 etc
Growth opportunity(GRO)	capital expenditures/total assets	-	+	-: Lang L. E. et. al., 1996 Jensen M. et. al., 1975, Smith C. 1977, Warner, J., 1979, Green R., 1984 Myers S., 1977 etc +: Titman S.

				et. al., 1988 Frank Z. et. al., 2009
Tangible assets(TA)	Property, plant and equipment/total assets.	+/-	+	+/-: + Frank Z. et. al., 2009 Scott J., 1972, Myers S. et. al., 1984 etc - Grossman et. al., 1982 etc +: Myers S. et. al., 1984 etc
Liquidity(LIQUIDITY)	current assets/ current liability	+	-	+: Ozkan A, 2001 Pano A., 2003 etc -: Ozkan A., 2001 Prowse S. D., 1991 etc
Profitability(PRO)	operating income/total asset	+	-	+: Ross S., 1977 Modiglian i F. et. al., 1958 Jensen M., 1976 etc -: Myers S. et. al., 1984 Titman S. et. al., 1988,

				Fama E. et. al., 2002 etc
Industry classification(INDSTRY)				Rajan R. G. et. al., 1995 Myers S., 1984, Haris M. et. al., 1991 William L. M. et. al., 2007 Titman S., 1984 etc

4. Data collection and Methodology

It is going to move into empirical part after reviewing the hypothetical framework and findings from theories of capital structure. In this section, it is going to detail the sample data this paper collected and the empirical method used in this paper.

4.1 Data collection

Since this paper is researching for the companies in Japan, the data collected would be accounting data from Japanese companies. In order to get more trustable data from balance sheets, income statements and cash flow statements, it would like to choose companies basic on NIKKIE 225, which is an index of 225 representative companies in Japan. The data are collected from datasteam and the period is from 2003 to 2013. In other words, the data collected yearly accounting data for the dissertation is a panel data from Japanese NIKKIE 225 index over the period from 2003 to

2013.

However, it is not all the data reliable for our study. Hence, it has to modify the data according to econometric procedure. Firstly, it has to remove the financial industries such as banks, financial services, nonlife insurance, life insurance and real estate investment and services from the sample data because the regulation of these financial industries is quite different from other industries. As Shah and Khan (2007) explain, the characteristics of financial industries such as deposit insurance and different financial report rules are special and different from other industries (Shah A. et. al., 2007). William and Scott and Lawrence (2007) explain the investors believed that the regulation of such industries involves at least guarantee that the government will not allow them to go into bankruptcy (William L. M. et. al., 2007). That is quite different regulation between financial industries and non-financial industries. Hence, it has to eliminate the financial industries from the sample data. Secondly, it is not receivable to analyse the figures which are less than three years. The special data will affect the result significantly. As Ozkan's (2001) statement, it has to be continuous time series for more than three years of the variables required in the study (Ozkan A., 2001). Therefore, the companies included only three years accounting data will not appear in the sample data. Last but not least, the accounting rules should be consistent, so the companies have to register in Japan and follow the accounting rules in Japan. The reason is that it needs to have a consistent circumstance for the data so that it can reduce the unsteadiness.

Hence, after the econometric procedure, the number of observations for the sample is 193 companies which are from 9 industries excluding financial industry during the period from 2003 to 2013. And the total observation in the sample data is 1892. It can have a clear overview of the sample data

through tables. The table 1 is as follows:

Industry	Frequency	Percentage
Consumer Goods	416	21.99
Oil & Gas	16	0.85
Industrials	659	34.83
Consumer Services	201	10.62
Basic Materials	277	14.64
Technology	139	7.35
Health Care	94	4.97
Telecommunications	40	2.11
Utilities	50	2.64
Total	1892	100

TABLE 1: The summary of industry characteristics

The table 1 above shows clearly what the industries are included and how many percentages and numbers in the sample data. Through the overall of sample data, it has a reliable cross-section data in different industries.

4.1.1 Independent variable definition

As defined in the previous part, the independent variables were defined respectively. NDTS is the ratio of depreciation expense to total assets, size is simply logarithm of sales, and GRO is the ratio of capital expenditures to total assets, TA is property, plant and equipment to total assets, LIQUIDITY is the ratio of current assets to current liability and PRO is the ratio of operating income to total assets.

As table 2 summarized, it is easy to see that the most floating independent variable is liquidity, which the mean is 61.56938 and the standard deviation is 345.7952. The highest range of liquidity suggests that the companies in Japan may face a potential bankruptcy risk due to the quite different range of liquidity ratio. According to the equation of liquidity, the mean 61.56938

states that the average current assets are significant higher than the average current liability. In other words, the average of ability that repay for the loan is good. However, the standard deviation 345.7952 suggests that it has a great gap among different companies. Some companies can have a good ability to repay to loan and expand their profitability while some companies are facing the potential risk of bankruptcy because they have fewer current assets than the current liability they bear and cannot increase their value from the market. Moreover, the size is relative higher ratio excluding the liquidity. The size is the simply logarithm of sales. It means that it can represent to the sales in the market. Furthermore, the size has a similar suggestion as liquidity. The mean 9.541216 suggests that the average of profitability is good. Companies can create their value from the market. On the other hand, the standard deviation 7.162113 means that companies have different performance in the market. While some companies have large markets, other companies have difficulty to create value from markets. The growth opportunities have a relatively higher mean 4.865682 and standard deviation 3.180465. It suggests that the companies have different performance in financing their capital structure. The companies have wide range requirement of financing from outside market because of a high variance and they tend to invest in the project because of a high mean.

Independent variables	Observation	Mean	Standard deviation
NDTS (Non-debt tax shields)	1892	0.0436582	0.223078
SIZE (Size)	1892	9.541216	7.162113
GRO (Growth opportunities)	1892	4.865682	3.180465
TA (Tangible assets)	1892	0.344286	0.1795787
LIQUIDITY (Liquidity)	1365	61.56938	345.7952
PRO (Profitability)	1892	0.0610392	0.0609237

TABLE 2: The summary of Independent variables

4.1.2 Dependent Variable definition

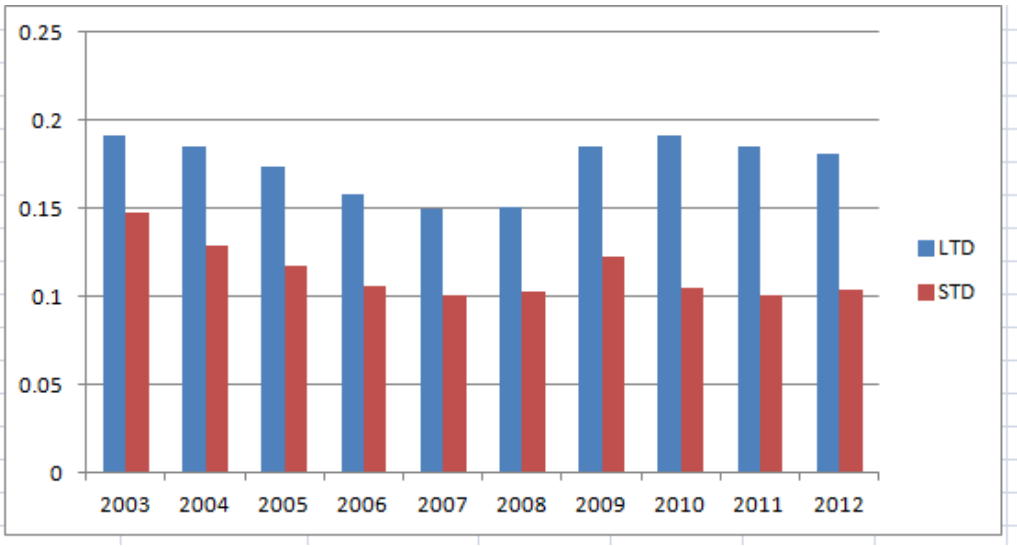
Since many empirical researches discussed above were selecting long term debt ratio and short term debt ratio as their dependent variable, it is reasonable to apply long term debt ratio and short term debt ratio followed by the previous researches. In this study, the long term debt ratio is defined as a ratio of long term debt to total assets. Similarly, the short term debt ratio is expressed as a ratio of short term debt to total assets. However, it still has an argument in measuring the value of the dependent variable. The argument between market value and book value is put forward by Barclay, Myers and so on. Barclay suggested that it is no reason to use either book value or market value as book value is a backward looking while market value is forward looking (Barclay et. al., 2006). However, Myers (1977) argues that book value can represent the fluctuating of financial markets and managers believed that market value is not reliable because the market value is following the corporate financial policy (Myers S. C., 1977). In addition, as Guihai and Frank (2006) point out that it is difficult to measure the market value. Moreover, the market value is difficult to define clearly since the market change over time (Guihai H. et. al, 2006). Therefore, in this

study, it is following to apply book value for the dependent variables. The two dependent variables can be summarized as a table 3 as follow:

Dependent variable	Observation	Mean	Standard deviation
LTD	1892	0.1750851	0.1280496
STD	1892	0.1133681	0.0861607

TABLE 3: The summary of dependent variables

The mean and variance of long term debt ratio is 0.1750851 and 0.1280496 respectively whereas the mean and variance of short term debt ratio are 0.1133681 and 0.0861607. Compared the figures for long term debt ratio and short term debt ratio, it suggests that companies are a little prefer long term debt than short term debt since the difference of mean. However, in the light of variance, companies have different performance in financing long term debt as the variance is 0.1280496 while companies perform the same behaviour in financing short term debt since the small variance which is 0.0861607. The graph 4 below can show companies have similar performance in increasing short term debt over time. From 2003 to 2013, the companies tend to have similar short term debt, especially in the year 2006, 2007, 2008, 2010, 2011 and 2012.



GRAPH 4: The differences between long term debt and short term debt from 2003 to 2012

4.2 Methodology

Since the study is based on quantitative analysis, it is recommended to use a quantitative approach rather than qualitative approach. The empirical research approaches including ANOVA, cross-sectional analysis and panel data analysis are considered in this study. ANOVA is a research approach to study the relationship between independent variables and dummy variables or qualitative variables (Gujarati et. al., 2009). With ANOVA approach, it is going to do regression between the dependent variables which are long term debt ratio and short term debt ratio with the dummy variable. The purposes for using ANOVA is to analysis the industry classification by creating dummy variables and then do a regression between long term debt ratio and short term debt ratio with the dummy variables. In the cross-sectional analysis, it is a first try to regress the data through ordinary least squares (OLS). However, compared with panel data analysis, it can have an argument with which model is more appropriate for this study. Therefore, it is necessary to have a second try to regress the panel data through ordinary least squares.

4.2.1 ANOVA test for industry classification

In the sample data, it is specified the companies in 9 industries which are Consumer Goods, Oil & Gas, Industrials, Consumer Services, Basic Materials, Technology, Health Care, Telecommunications and Utilities. The 9 different industries have different characteristics so that there are different effects on the capital structure decision for each firm. It is confirmed by Long and Malitz that industry classification has a significant effect in the capital structure (Long M. et. al., 1985). To find out the influence from industry classification, it is going to make use of the one way ANOVA model. The 9

industries are necessary to be created as industry dummy variables and regress against independent variable. In other words, the one way ANOVA is adopted to research the effect from industries to leverage. The empirical works define the ANOVA model as follows,

$Y_{LTD}=A + B_i*$ DUMMY VARIABLES $+ e_i$

$Y_{STD}=A + B_i*$DUMMY VARIABLES $+ e_i$

Where Y_{LTD} and Y_{STD} are accounted as long-term leverage and short-term leverage, respectively; A is constant intercept in the regression; B_i represents the coefficient between leverages and dummy variables; DUMMY VARIABLES are classified as industrial dummy variables; e_i is standard error terms.

4.2.2 Cross-sectional analysis

As Hill, Griffiths and Lim (2001) explain, cross-section data is defined as a set of data on a number of economic units such as firms and industries at only a given time point (Hill R. C. et. al., 2012). As the definition, it is clear that if following cross-sectional analysis, the sample data will only have one year time point. That will cause an unauthentic result in this study due to only consider the cross-sectional data. The model defined in cross-sectional analysis is as follows,

$Y_{LTD}=A + B_1NDTS + B_2SIZE + B_3GRO + B_4TA + B_5$ LIQUIDITY $+ B_6PRO + e_i$

$Y_{STD}=A + B_1NDTS + B_2SIZE + B_3GRO + B_4TA + B_5$ LIQUIDITY $+ B_6PRO + e_i$

Where Y_{LTD} and Y_{STD} are same meaning as an ANOVA model; NDTS is proxy for non-debt tax shields; SIZE is proxy for sales; GRO is proxy for growth

opportunities; TA is a proxy for tangible assets; LIQUIDITY is a proxy for liquidity; PRO is a proxy for profitability; B_1, B_2, B_3, B_4, B_5, B_6 are coefficients between NDTS, SIZE, GRO, TA, LIQUIDITY, PRO with independent variables, respectively; e_i is error terms.

4.2.3 Panel data analysis

Panel data are also called longitudinal data, which has observations on different firms following by time periods according to Hill, Griffiths and Lim (Hill R. C. et. al., 2012). Compared with the simple model which is a cross-sectional analysis with panel data analysis, it has some reasons to select panel data analysis as our approach in order to get reliable results.

Firstly, it is the most important and essential reason for selecting panel data analysis. According to Hill, Griffiths and Lim (2012), the complex and rich structure of panel data can address a wide range of issue and enhance the degree of freedom ((Hill R. C. et. al., 2012). In other words, panel data are more appropriate in this study because the complex theories discussed in the previous part. Secondly, according to Hsiao's point, pure time-series data have to do a lot of work to reduce the co-linearity within the variables. By combining cross-sectional data with time-series data which is panel data, it helps to ease problems of multicollinearity and enhance the confidence level of the results (Hsiao C., 2003). Hence, it eliminates a requirement to do a long run of data and increase the number of degrees of freedom. Thirdly, Hill, Griffiths and Lin (2012) point out that it can keep the omitted variables bias avoided by structuring panel data in a suitable way (Hill R. C. et. al., 2012). Therefore, the results can be more trustable and meaningful.

In the previous empirical works, Ozkan, Bevan and Danbolt define the panel

data model (Ozkan A., 2001, Bevan A. et. al., 2002). The model is expressed as follows:

$Y_{LTD}=A + B_1NDTS + B_2SIZE + B_3GRO + B_4TA + B_5\ LIQUIDITY + B_6PRO + f_{it} + e_i$

$Y_{STD}=A + B_1NDTS + B_2SIZE + B_3GRO + B_4TA + B_5\ LIQUIDITY + B_6PRO + f_{it} + e_i$

Where Y_{LTD}, Y_{STD}, B_1, B_2, B_3, B_4, B_5, B_6, e_i NDTS, SIZE, GRO, TA, LIQUIDITY, PRO, e_i is the same meaning as a cross-sectional model. Moreover, it has a f_{it} in the panel data model which means firm-specific effects.

The hypotheses assumption of this model is,

The null hypotheses: $H_0 : B_0 = B_1 = B_2 = B_3= B_4 = B_5= B_6 = 0$. The null hypotheses mean that all the variables cannot explain the relationship between leverages and variables in Japanese firms.

The alternative hypotheses: $H_0 : B_0$ is false. It means that at least one of the variables can explain the relationship between leverages and variables in Japanese firms.

In financial econometric, there are three major panel data models which are pooled OLS model, fixed OLS model and random OLS model. It will discuss which model is appropriate for the sample data in this study based on diagnostic tests.

5. Empirical research and analysis

In this part, it is going to summarize the empirical research for the sample data and present the results of the research. Moreover, it is to present what factors affect the capital structure of Japanese firms and analyse the reason why the factors affect the capital structure according to the pervious

theories.

5.1 Empirical results from ANOVA and analysis of the industry classification

As Rajan and Zingales's (1995) finding, the industry characteristics can affect the capital structure when different industries consider their decisions within their own regulation (Rajan R. G. et. al., 1995). One-way ANOVA analysis is applied in this study in order to find whether the industry characteristics will affect the capital structure and which industries have the most significant influence. The industries are considered as dummy variables in the one-way ANOVA model. As pervious part, the summary of industries was presented in table 4. And the ANOVA results are going to present as follows:

Type of leverage	F value	Prob > F (p value)
Long term debt leverage	70.28	0.0000
Short term debt leverage	23.41	0.0000

TABLE 4: Results of ANOVA

The above table 4 for one-way ANOVA model shows that it can reject the null hypothesis in 1% confidence level which is both of the two leverages of all industry classification is the same according to both p values are less than 1%. In other words, the industry classification will affect the decision of capital structure. The overall results of the ANOVA model in this study are confirmed within the trade-off theory and the pecking order theory. In order to explain the industry classification clearly, it needs to look at the coefficients from the regression between both two leverages with dummy variables. The coefficients are shown in the following table 5.

	LTD	STD
Consumer Goods	-0.0880672 (0.000)	0.400762 (0.003)
Oil & Gas	-0.1463392 (0.000)	-0.0013447 (0.956)
Industrials	-0.0698233 (0.000)	0.0427792 (0.001)
Consumer Services	0.0525872 (0.000)	0.0149135 (0.001)
Basic Materials	-0.057659 (0.007)	0.0744802 (0.296)
Technology	-0.1215716 (0.002)	0.0066764 (0.000)
Health Care	-0.1593753 (0.000)	-0.0369155 (0.651)
Telecommunications	0 (omitted))	0 (omitted)
Utilities	0.1623521 (0.000)	0.0072591 (0.678)
Constant	0.235789 (0.000)	0.0783305 (0.000)
R^2	0.2299	0.0904
Number of observations	1892	1892

TABLE 5: The coefficients from ANOVA

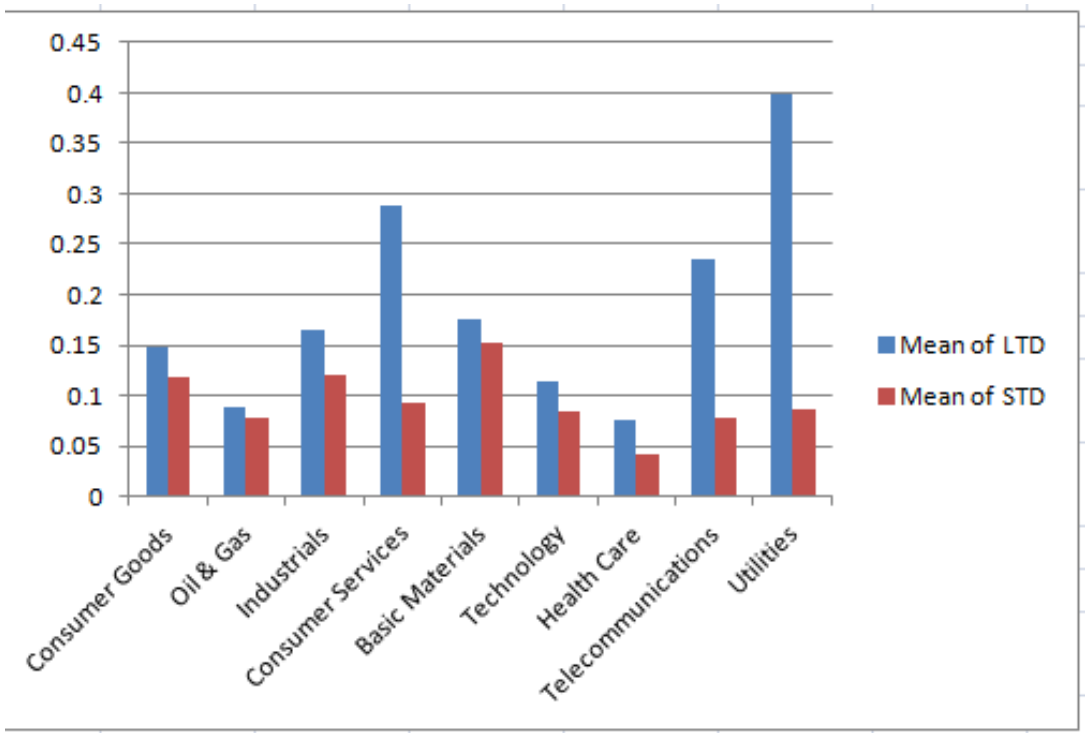
Firstly, the R^2 for long term leverage and short term leverage are 22.99% (0.2299) and 9.04% (0.0904), respectively. Since it is no research for Japanese firms, it is going to take Bennett and Donnelly's (1993) research for a benchmark. According to their finding, industry classification could be explained around 9.4% of the variation in terms of book value basing on the UK sample data (Bennett M. et. al., 1993). Hence, it is confident in explaining the industry classification using long term debt leverage which has 22.99% R^2. Moreover, it is easy and clear to conclude that in regression between long term leverage with dummy variables, all the coefficients are strongly significant in 1% confidence level due to all the p values are less than 1%. On the other hand, in the light of the regression between short term leverage with dummy variables, there are only five dummy variables significant and others are not. It means that it is that not all the coefficients can explain the industry classification. Therefore, this study is going to select the regression between long term leverage and dummy variables to discuss the industry classification.

Furthermore, the summary of mean can explain the relationship between long term leverage and short term leverage across different industries. The

mean is summarized as follows, and it can express by graph to see clearly. It helps to explain how the industry classification affects the decision of capital structure.

	Mean of LTD	Mean of STD
Consumer Goods	0.14766172	0.11840667
Oil & Gas	0.08938979	0.0769855
Industrials	0.16590568	0.12110968
Consumer Services	0.28831616	0.09324392
Basic Materials	0.17596301	0.15281066
Technology	0.11415731	0.0850069
Health Care	0.07635366	0.04141493
Telecommunications	0.2357894	0.07833046
Utilities	0.39808103	0.08558959

TABLE 6: The summary of mean of long term debt and short term debt



GRAPH 5: The trend of firms to finance the capital structure with long term debt and short term debt

From the above table 6 and graph 5, it is easy to confirm that the firms in Japan prefer long term leverage than short term leverage as the graph shows that the mean of LTD is always higher than the mean of STD. The reason why the firms prefer long term leverage might be the cost of long

term debt. The long term debt is cheaper than the short term debt due to the different interest rate. Moreover, some industries have a quite significant performance in the decision of capital structure. Compared the mean of LTD with the mean of STD, customer services and utilities industries can represent for this performance. The reason for these two industries might follow William's option (William L. M. et. al., 2007). For customer services, the industry tends to have a higher ability of profitability so that they can bear a long term loan. Since this industry can raise their finance, they can enlarge their market to get more profit. For utilities, investors trust the industry regulation since the government will not allow these firms to bankrupt easily. As this reason, this industry can afford a large long term debt. Moreover, the coefficients of both tow industries also confirm this performance. The coefficient of customer services is 0.0525872 as well as the coefficient of utilities is 0.1623521. Only these tow coefficients are positive among all the coefficients. It has a good reason to believe that both of these industries prefer long term debt than short term debt.

In our results of the coefficients, it is clear to see that most of the coefficients are negative with the long term leverage except for the customer services and utilities. The reason why most of the industries have a negative relationship between long term leverage and industry classification might be the cash flow problem. As Titman (1984) points out, some firms require free cash as more as they can because the costly liquidation (Titman S., 1984). For industry and basic material which the coefficients are -0.0698233 and -0.057659 respectively, they are matching the view with the cash flow problem. Due to the characteristic of these industries, it takes a longer period for manufacturing machines or equipments. Moreover, it also needs longer times to convert products into cash flow. Therefore, the liquidation is especially costly for these industries. These firms prefer internal finance than external finance to avoid the cost of debt. Moreover, they keep low risk

of default the debt so that they have less bankruptcy risk.

Take health care for another example; the health care industry has different regulations with industry and basic material because the health care industry is considered as firms mainly had intangible assets. Moreover, Rajan and Zngales (1995) point out that this industry has a negative relationship with leverage (Rajan R. G. et. al., 1995). The reason for the negative coefficient in the health care industry might follow the pecking order theory. The managers can access the insider information, for example a new innovative product, easier than outside investors. This will cause asymmetric information problems in the market. In order to avoid the cost of debt, firms would tend to finance their capital structure using internally found. Hence, the health care industry could have a negative relationship. The same reason can apply to the technology industry. Since technology industry is a high tech industry so that they reform their products very quickly. For this kind of industry, high long term leverage may cause their insufficient retained earnings. Therefore, they are going to face a free cash flow problem. For this reason, the technology industry would tend to have a negative relationship.

5.2 Empirical results from panel data model and analysis of the determinants

Since there are three major panel data models in financial econometric, it needs some diagnostic tests to decide which one is more appropriate for the sample data in this study. In the following part, it is going to present the result of the diagnostic tests.

5.2.1 Diagnostic tests

5.2.1.1 Multi-collinearity problem

One of important assumptions that are made by OLS regression is that the explanatory variables are not multi-correlated with each other. As Chris explained, it means that the explanatory variables are independent of each other and to be said to be orthogonal to one another (Chris B., 2008). If the multi-colinearity problem exists in the explanatory variables, the regression would have some problems. According to Chris's study, R-square will be affected by the multi-colinearity problem so that it cannot be a significant measurement for the regression. More details, since the R - square will be high and the individual coefficient will have high standard errors, individual coefficient are not significant. Secondly, the small changes in explanatory variables will cause a very significant change in the whole regression. Finally, the confidence intervals will be large range due to this problem. Hence, it will give an inappropriate conclusion from this regression (Chris B., 2008). Correlation matrix among the explanatory variables will be made use in this study as it is a simple and clear approach to test the multi-colinearity problem. As Gujarati and Porter (2009) point out, the benchmark for the correlation matrix is less than 0.8 in coefficient between two independent variables (Gujarati et. al., 2009). If the coefficient between two variables is below 0.8, then it will conclude that it is not multi-colinearity problem in the explanatory variables. The correlation matrix table for our sample data is shown below table 7,

	LTD	STD	NDTS	SIZE	GRO	TA	LIQUIDITY	PRO
LTD	1.0000							
STD	0.3093	1.0000						
NDTS	0.1043	0.0160	1.0000					
SIZE	-0.0107	-0.3271	0.2632	1.0000				
GRO	0.1125	-0.0108	0.5033	00.2639	1.0000			
TA	0.5421	0.1810	0.3391	0.2230	0.4168	1.0000		
LIQUIDITY	-0.0964	-0.0696	0.0101	0.0292	0.0062	-0.0903	1.0000	
PRO	-0.3280	-0.3248	0.0108	0.5414	0.1433	-0.1273	0.2282	1.0000

TABLE 7: The result from multi-colinearity test

According to the table, the biggest coefficient is 0.5421 between LTD and TA. It is still less than the benchmark 0.8. Therefore, it can conclude that it is no multi-colinearity problem in our sample data.

5.2.1.2 Heteroscedasticity problem

The assumption of heteroscedasticity which means the variance of the errors is constant (var (u) =σ^2) is made in the standard regression (Hill R. C. et. al.,2012). If the sample data has heteroscedasticity problem, the OLS estimators will be unbiased. Therefore, it needs to test the assumption for our sample data. In this study, the Breusch-Pagan test will be applied and the results are as follows,

The null hypothesis: H_0: the sample data has constant variance

The alternative hypothesis: H_1: the sample data does not have constant

variance

	LTD	STD
P-value	0.0296	0.0000

TABLE 8: The result from Breusch-Pagan test

The above p-values indicate that both of the two leverages are not significant at 5% and 1% confidence level, respectively. It means that both of them have to reject the null hypothesis and hence, both of the two leverages have heteroscedasticity problem. The results show that the standard regression is not appreciated for the sample data. Hence, it needs to estimate the regressions by using heteroscedasticity-constant standard error estimates which are present by White (White H., 1980). The following pooled model is applied this method.

5.2.1.3 F-test for pooled OLS and Fixed effects model

Since it can apply the heteroscedasticity-constant standard error estimates in pooled OLS, it also needs to consider that heteroscedasticity has to be controlled in the fixed effects model. As Hill et. al. (2008) state, the F-test is used to determine which model is more appropriate (Hill et. al., 2008). The results are as follows,

The null hypothesis: H_0: Pooled OLS is appropriate
The alternative hypothesis: H_1: Fixed effects model is appropriate

	LTD	STD
P-value	0.0000	0.0000

TABLE 9: The result from F-test

From the above table 9, it is easy to see that both of the p-values are significant. It means that the null hypothesis can be rejected at the 5 %

confidence level. Therefore, the fixed effects model is appropriate for both long term leverage and short term leverage.

5.2.1.4 Breusch-Pagan LM test for pooled OLS and Random effects model

The difference between pooled OLS and Random effects model is that it considers individual heteroscedasticity exists in the Random effects model while pooled OLS is not (Chris B., 2008). The Breusch-Pagan LM test is aimed to test which model is more suitable. The results are as follows:

The null hypothesis: H_0: the variance of individual effect is zero; it means that the pooled OLS is suitable
The alternative hypothesis: H_1: the variance of individual effect is positive; it means that the Random effects model is suitable

	LTD	STD
P-value	0.0000	0.0000

TABLE 10: The result from Breusch-Pagan LM test

The results show that it can reject the null hypothesis at the 5 % confidence level as the p-value is very significant. In other words, the variance of individual effect is positive and the Random effects model is more appropriate for both long term leverage and short term leverage.

5.2.1.5 Hausman Test for Fixed effects model and Random effects model

In Hausman test, it is going to distinguish which model is better for the

sample data. The aim of Hausman test is to find out whether there is any correlation relationship between individual effects as defined by Hill (Hill et. al., 208). The results are as follows,

The null hypothesis: H_0: Individuals' effects and regressors are not correlated; it means that the Random effects model is better
The alternative hypothesis: H_1: Individuals' effects and regressors are correlated; it means that the fixed effects model is better

	LTD	STD
P-value	0.0000	0.0000

TABLE 11: The result from Hausman Test

From the above table, it can clear to conclude that it can reject the null hypothesis at the 5 % confidence level. It means that the Fixed effects model is more appropriate than the Random effects model in the sample data.

5.2.2 Analysis of Japanese firms' capital structure determinants of the fixed effects model

From the front part, it concludes that the Fixed effects model is the most appropriate. The results are shown as follows table 12:

	LTD	STD
NDTS (Non-debt tax shields)	1.265751 (0.000)	0.3215141 (0.008)
SIZE (Size)	0.0000133 (0.970)	-0.0014557 (0.000)
GRO (Growth opportunities)	-0.0027297 (0.000)	0.0003501 (0.520)
TA (Tangible assets)	0.0152803 (0.742)	-0.0309735 (0.414)
LIQUIDITY (Liquidity)	-5.23e-06 (0.264)	8.59e-07 (0.823)
PRO (Profitbility)	-0.320413 (0.000)	-0.0067361 (0.833)
Constant	0.1425222 (0.000)	0.1149265 (0.000)
Fixed effects	0.11343833	0.27240579
R^2	0.1750	0.0351
Number of observations	1365	1365

TABLE 12: The result of fixed effects model

According to the results, it shows that some of the determinants have significant impact on capital structure in the sample data from Japanese firms. However, from the R^2 which are 0.1750 in LTD and 0.0351 in STD, the regression models have a low confidence level. In additions, some of the factors cannot be one of the determinants in capital structure because the p-values are very low among the long term leverage and the short term leverage. It is trying to explain and find a reason for these results below.

5.2.2.1 Non-debt tax shields (NDTS)

The coefficients of NDTS are 1.265751 and 0.3215141, respectively. Both of the coefficients are significant at 5% confidence level in the model because of the p-values. It means that it has a positive relationship between non-debt tax shield and long or short term leverage. The results are the same as Scott and Moore's findings (Scott J., 1977, Moore T. W., 1986). The significant increase in long and short term leverage can be explained that the long term debt can bring significant advantages from non-debt tax shields. If the firms in Japan have enough taxable income, the taxable

income can support the firms with a large amount of debt. The non-debt tax shield can reduce the tax from the corporate income due to the tax system. Therefore, the taxable income increases. According the pecking order theory, the firms prefer to retained earnings than outside financing and debt than equity. Moreover, the firms with more debt can have more taxable income due to the non-debt tax shields. As Scott and Moore explained, it can confirm that it is a positive relationship between NDTS and long/short term debt in Japanese firms.

5.2.2.2 Size (SIZE)

Unlike the NDTS, the SIZE has two different relationships in the long term leverage and short term leverage. In the long term leverage, it has a positive relationship between size and leverage. However, the outcome is not significant due to the p-value. It has a lower power in explaining the determination of capital structure. On the other hand, in the short term leverage, it has a negative relationship between size and leverage. The outcome is significant. Both of the relationships are put forward by different researchers.

In the view of Warner and Ang, Chua, and McConnell, they point out it is a positive relationship (Warner J., 1977, Ang C. K. et. al., 1985). Even though the result of long term leverage is not very significant, it still has some powerful explaining. According to the trade-off theory, the bankruptcy cost will impact the capital structure. Large firms have more capacities to suffer from bankruptcy cost than small size firms. It means that in long term debt, large size Japanese firms will tend to borrow more debt. In other words, it has a positive relationship between size and long term debt. However, from Smith’s perspective, it has a negative relationship. The result in short term

debt has the same finding. In the view of the pecking order theory, large size firms prefer to retained earning firstly. In addition, large size firms have the motivation to use their own retained earnings due to they tend to have more profitability. Therefore, the large size firms will not borrow too much debt from outside market. The result in Japanese firms means that the large size firm will not borrow more short term debt than small size firms. In short term debt, it has a negative relationship between size and short term debt.

5.2.2.3 Growth opportunity (GRO)

The coefficients of growth opportunity show that it has a negative relationship both in long term leverage and short term leverage with growth opportunity. However, it is only significant at 5% confidence level in long term leverage while it is not significant in short term debt. However, the results are the same as the findings from Lang, Ofek, and StulZ (Lang L. E. et. al., 1996).

The results from Japanese firms are supported in the trade-off theory. In the trade-off theory, growth opportunity in firms will cause agency cost. Managers have conflicts with shareholders with growth opportunity for a firm. Mangers would like to have a good investment as soon as possible while shareholders tend to have flexible alternative of further investment. Therefore, it has an agency problem. The agency cost will reduce when issuing debt. Moreover, as Myers explained in bankruptcy cost, they tend to have less debt since these firms have fewer tangible assets. They are facing the bankruptcy risk if they finance their capital structure with much debt. Hence, these firms with much growth opportunity will tend to make use of debt. In Japanese firms, they may also suffer from the agency cost and bankruptcy risk so that they would not like to make use of debt.

In conclusion, although the short term leverage is not very significant, it has a negative relationship between growth opportunity and long term leverage in Japanese firms.

5.2.2.4 Tangible assets (TA)

The coefficients have conflict in long term leverage and short term leverage. In long term leverage, the coefficient is 0.0152803 which is positive while the coefficient is -0.0309735 which is negative in short term leverage. However, both of the coefficients are not significant in the model. It means that the tangible assets have very small power in explaining the capital structure of Japanese firms. However, in the previous empirical research, it should be a determination of capital structure. According to Jensen and Meckling (1976), Scott (1972), Myers and Majuf's (1984) research, it should be a positive relationship between tangible assets and leverage (Jensen M. et. al., 1976, Scott J., 1972, Myers S. et. al., 1984). The long term leverage can explain this relationship although it is very weak. In the trade-off theory, the researchers explain that the positive relationship is due to the agency cost. Since firms issue debt for the investment in the market, it will shift the risk from creditors to shareholders. In addition, shareholders would not accept too much debt because of the risk. Hence, it is an agency problem between managers and shareholders. That causes the agency cost of debt. However, tangible assets can overcome the agency cost because the risk can be reduced. Moreover, the pecking order theory provides the same relationship between long term debt and tangible assets. Myers and Majluf (1984) explain that in the light of asymmetric information costs (Myers S. et. al., 1984). The managers can access inside information easier than outside investors. An advantage exists in such opportunity. Firms can issue more

debt since the cost of issuing debt can avoid the asymmetric information costs.

On the other hand, according to Grossman and Hart's (1982) view, it is a negative relationship (Grossman J. et. al., 1982). The short term debt can also explain even though it is weak too. In the light of bankruptcy costs, the tangible assets can give enough confidence to shareholders. Hence, shareholders are afraid to face the bankruptcy risk. That will cause lower debt in a firm.

Although our results cannot be good evidence, it can still consider this factor as a determination of capital structure according to empirical research such as Jensen and Meckling, Scott, Myers and Majuf (Jensen M. et. al., 1976, Scott J., 1972, Myers S. et. al., 1984).

5.2.2.5 Liquidity (LIQUIDITY)

From this factor, tangible assets, the results of liquidity have the same situation. It has a conflict in long term leverage and short term leverage as the different coefficients. The coefficient of long term leverage is negative while the coefficient of short term leverage is positive. Besides, the results are not significant as tangible assets, too.

The coefficients are quite not significant from the results since the estimators are too small. The liquidity might not have enough power to explain the capital structure of Japanese firms as a determination. According to empirical researches, there exist two relationships between leverage and liquidity from different theories. It is the same as the results. According to Ozkan's (2001) empirical research, it provides a positive relationship

between liquidity and short term debt (Ozkan A., 2001). Firms with high liquidity have motivation to borrow more debt since they can repay the loan to creditors. Especially, in short term debt, companies can have a large amount of cash flow as they borrow short term debt and then repay the loan. Therefore, firms can enlarge their market with enough funds. It is consistent with the positive relationship between short term debt and liquidity in the trade-off theory. On the other side, Ozkan (2001) also argues a negative relationship between long term debt and liquidity (Ozkan A., 2001). According to the pecking order theory, firms prefer their own retained earnings in the first place. Firms with high liquidity would prefer their retained earnings if it is enough. Hence, firms would not have motivation to borrow more debt. The negative relationship between long term debt and liquidity is consistent with the result in the light of pecking order theory.

5.2.2.6 Profitability (PRO)

Profitability factor is significant in the long term debt which the coefficient is -0.320413 whereas it is not significant in the short term debt which the coefficient is -0.0067361. Although it is not significant in the short term debt, they have the same trend between leverage and profitability. The relationship between leverage and profitability is negative in Japanese firms. In other words, the Japanese firms are implied the pecking order theory is significant in explaining the negative relationship. According to Myers and Majluf's (1984) view, it has a negative relationship between profitability and leverage as the pecking order hypothesis (Myers S. et. al., 1984). The asymmetric information exists between managers and investor. This problem will be costly and if firms finance their fund with retained earnings, they can avoid the cost of asymmetric information problem. In the results, it shows that Japanese firms would prefer internal finance than external

finance if it is enough funds for firms to invest in their project. Hence, it has a negative relationship between leverage and profitability in Japanese firms.

6. Conclusion and Research limitations

6.1 Conclusion

This dissertation is trying to figure out three main issues which are put forward in the beginning. Firstly, it attempts to find out what the determinants are significant in capital structure with sample data from Japanese companies in the NIKKIE 225 index. Secondly, it is using different leverage ratios across different industries in Japan to explain how the determinants impact the capital structure. Furthermore, it is to discuss which theory is most relevant to explain the approach of financing fund in Japanese firms from NIKKIE 225 index. The analysis of this study is basic on financial Econometrics process. The sample data is collected from a panel data set of 193 non-financial firms in the NIKKIE 225 index from 2003 to 2013 which included 10 year period. The six determinants set by this study are provided by previous empirical researches, which are non-debt tax shields, firms' size, and growth opportunity, tangible assets in firms, liquidity ratio and profitability. In addition, the industry classification is also a determination to affect the capital structure. The analysis finds out the relationship between all the determinants and different leverage ratios in order to find out the answer of the three issues.

In the beginning of this study, the one way ANOVA analysis is applied to find out whether the industry classification determination is significant in affecting the capital structure of Japanese firms or not. The finding of this study indicates that the classification determination is one of significant

determinants of capital structure in Japanese firms. It is consist with the previous studies which put forward by Rjan and Zingales, Myers and Haris and Ravis, William and so on (Rajan R. G. et. al., 1995, Myers S., 1984, Haris M. et. al., 1991, William L. M. et. al., 2007). The one way ANOVA analysis shows that different industries have different performance in the different approaches of financing funds. In the view of long term debt, customer services and utilities have a more significant high long term debt than other industries which can be explained by the trade-off theory. On the other hand, in the view of short term debt, industry and basic material have negative behaviour with short term debt finance. The reason of such negative relationship can be explained by the pecking order theory. Moreover, firms with more intangible asset would like to finance their funds by using internal finance. It means that firms with more intangible asset such as health care would like to have less than other industries both in long term debt and short term debt.

Moreover, it is to apply Fixed effects models which are the most suitable model for our sample data to discuss the determinants of capital structure. The results from Fixed effects models show that some determinants have significant impact on decision of capital structure. And there are different trends between long term debt and short term debt according to different determinants. The results are summarized as follows:

Non-debt tax shields are a significant determination both in long term debt and short term debt. It is trustable that there is a positive relationship between two kinds of leverages and non-debt tax shields. Its effects are consistent with one aspect of the pecking order theory. However, it still has argued in pecking order theory for the negative relationship. It is still not convinced of the relationship between leverages and non-debt tax shields.

The size of the firm only has influence in short term debt and it is not significant in long term debt. The negative relationship means that large size firms will tend to have less debt while small size firms will have more debt. The reason might be explained in the pecking order theory. Firms prefer internal finance than external finance. Moreover, large firms have enough retained earnings to invest in their project. They prefer internal finance in the first place to avoid the cost of debt.

Growth opportunity can be a good determination for both long term debt and short term debt. It has a consistent negative relationship with capital structure. It means that firms with a good growth opportunity would like to have less debt. The finding is consistent with the trade-off theory. The reason explained in the trade-off theory might cause from agency cost and bankruptcy cost.

Tangible assets have a small power in explaining the capital structure as one of determinants. Although tangible assets are too weak in explaining the capital structure, it still needs to be considered as one of the determinants. The long term debt has positive relationship which is consistent with the one explained by the trade-off theory and pecking order theory. Moreover, the trade-off theory explains the negative relationship between short term debt and tangible assets. Therefore, it can conclude that the trade-off theory is more suitable to explain how tangible assets affect the capital structure in Japanese firms.

Liquidity has a very low power in explaining the capital structure as a determination. The small number of estimated coefficients cannot be very trustable. It still needs more evidences to test this factor. However, according to many empirical researches, liquidity should consider having a positive relationship in the light of the trade-off theory. Moreover, the

negative relationship exists in the pecking order theory. Therefore, it still needs more argument in this determination.

Profitability has an ability to explain as determination of capital structure in long term debt. It has a negative relationship between long term debts with profitability which is consistent with the results from the pecking order theory. The reason might due to asymmetric information problem so that firms would not like to finance with debt. Firms prefer internal finance than external finance in order to avoid the cost of the asymmetric information problem. Therefore, it supports the pecking order theory with this result.

Through this dissertation, it cannot have a convincing theory to explain the behaviour of financing capital structure of Japanese firms because the results are quite mixed from the model. However, the trade-off theory plays a more important role in firms' decision of capital structure. The trade-off theory is focused on agency cost and especially, cost of financial distress. In Japanese history, firms in Japan are more dependent on the bank. They are more likely to raise their funds from the bank. This behaviour of financing funds might cause agency problems between managers and shareholders. Moreover, firms are potential to face bankruptcy risk. Both of these two reasons are discussed mainly in the trade-off theory. It might be the reason why the trade-off theory is suitable theory to explain the Japanese firms' behaviour of financing capital structure. Furthermore, it is also supported by some results found in this study, such as a growth opportunity and tangible assets. However, it is not the best theory to explain the firms' financial behaviour because the trade-off theory cannot explain all the determinants of capital structure. It still needs a further argument to find out an optimal theory to explain the capital structure of Japanese firms.

6.2 Research limitation

In this dissertation, it is trying to use a sample data from Japanese firms in the NIKKIE 225 index during the periods from 2003 to 2013. And it is also using some sensitive tests and models to test this sample data. However, it is still some limitations similar to previous empirical researches.

Although the sample data used in this study is trying to cover the most of Japanese companies and covering 9 non-financial industries, it is not considering the large number of private firms. It means that the large number of private firms may play an important role in this topic which is the determinants of capital structure. However, in order to get steady and constant figures, it ignored such large number of figures. Considering this case, bias might increase because the sample data cannot represent all of the companies in Japan.

Moreover, as the previous empirical researches, there are many different proxies for the variables. There might have potential problem with imperfect proxies of variables in this study. In this study, the variables are expressed as a direct ratio in order to reduce the multi-collinearity problem. However, the imperfect proxies of variables may reduce the confidence level of the model so that it may be no significant result. In brief, the imperfect proxies of variables will need to be improved in the future in the research. In addition, the macro factors such as GDP, inflation and interest rate, are not investigated in this study. It is believable that the macro factors might have some impacts in firms' finance behaviour. Hence, this problem also needs to be improved in the future study.

Finally, even though this study is recommended to use quantitative analysis

mainly, it lacks of some qualitative methods to improve the confidence level of the determinants of capital structure. In order to under the behaviour of firms in financing their capital structure, it is recommended to adopt the survey method. The survey method can explain how managers and shareholders are toward debt finance. However, it might not be obvious evidence comparing with quantitative approach. Hence, it still needs an argument to adopt both quantitative and qualitative approaches in the future.

References

Aggarwal R. and Kyaw N. A. (2010), 'Capital structure, dividend policy, and multinationlity: Theory versus empirical evidence' International Review of Financial Analysis, Vol. 19, pp. 140-150

Ang J. S. and Jung M. (1993), 'An alternative test of Myers' pecking order theory of capital structure: The case of South Korean firms', Pacific-Basin Finance Journal, Vol. 1, NO. 1 pp. 31-46

Ang J., Chua J. and McConnell J. (1982), 'The administrative costs of corporate Bankruptcy: A note', The Journal of Finance, Vol. 37, NO. 1 pp. 219-226

Armitage S. (2005), The Cost of Capital, Intermediate Theory, Cambridge University Press, Cambridge

Baltagi B. H. (2001), Econometric Analysis of Panel Data, John Wikey and Sons, New York

Bancel F. and Mittoo U. R. (2004), 'Cross-country determinants of capital structure choice. A survey of European firms', Financial Management, Vol. 33, pp. 103-132

Barclay M. J. Smith C. W. and Watts R. L. (2005), 'The determinants of corporate leverage and dividend policy', The Journal of Applied Corporate Finance, Vol. 74, NO. 4 pp. 4-19

Barclay M. J., Smith C. W. and Morellec E. (2006), 'On the Debt Capacity of Growth Options', The Journal of Business, Vol. 79, NO. 1 pp. 37-59

Barton S. L. and Gordon P. J. (1988), 'Corporate Strategy and Capital', The Journal of Finance, Vol. 22, NO. 3 pp. 395-403

Bennett M. and Donnelty R. (1993), 'The determinants of capital structure: some UK evidence', British Accounting Review, Vol. 25, pp. 43-59

Bevan A. A. and Danbolt J. (2002), 'Capital structure and its determinants in the UK – a de-compositional analysis', Applied Financial Economics, Vol. 12, NO. 3 pp. 159-170

Booth L. Aivazian V. Demirguc-Kunt A. and Maksimovic V. (2001), 'Capital Structures in Developing Countries', The Journal of Finance, Vol. 56, pp. 87-130

Boquist J. A. and Moore L. A. (1984), 'Inter-industry leverage differences and the DeAngelo-Masulis tax shield hypothesis', Financial Management, Vol. 1, pp. 5-9

Brealey R. A., Myers S. C. and Allen F. (2006), Principles of Corporate Finance, 8th Ed, McGraw Hill, New York

Brennan M. and Kraus A. (1987), ' Efficient Financing Under Asymmetric Information' The Journal of Finance, Vol. 42

Chris B. (2008), Introductory Econometrics for Finance, Cambridge University Press, Cambridge

Chung K. H. (1993), 'Asset characteristics and corporate debt policy, an Empirical test', The

DeAngelo H. and Masulis R. (1980), 'Optimal Capital Structure under Corporate and Personal Taxation', The Journal of Financial Economics, Vol. 8, pp. 3-29

Diamond W. D. (1991), 'Debt maturity structure and liquidity risk', The Quarterly Journal of Economics, Vol 106, NO. 3 pp. 709-737

Fama E. and French K. (2002), 'Testing trade-off and pecking order predications about dividends and debt', Review of Financial Studies, Vol. 15, pp. 1-33

Fama E. F. (1980), 'Agency Problems and the Theory of the Firm', The Journal of Political Economy, Vol. 88, NO. 2 pp. 288-307

Fischer E., Heinkel R. and Zechner H. (1989), Dynamic Capital Structure Choice: Theory and Tests, The Journal of Finance, Vol. 44 NO. 1 pp. 217-248

Frank M. Z. and Goyal V. K. (2002), 'Testing the pecking order theory of capital structure', The Journal of Financial Economics, Vol. 63, pp. 217-248

Frank M. Z. and Goyal V. K. (2007), 'Trade-off and Pecking Order Theories of Debt', proceedings of University of Minnesota and Hong Kong University of Science and Technology

Graham J. (2003), 'Taxes and Corporate Finance: A review', The review of financial studies, Vol. 16, NO. 4 pp. 1075-1129

Grossman J. and Hart O. (1982), 'Corporate Financial Structure and Managerial Incentives', The Economics of Information and Uncertainty, pp. 107-104

Grossman S. and Har O. (1982), 'Corporate financial structure and managerial incentive' The economics of information and uncertainty, Chicago, University of Chicago Press

Gujarati and Porter (2009), Basic Econometrics 5th Ed, McGraw Hill

Gujarati and Porter (2009), Basic Econometrics, 5th Ed, McGraw Hill

Harris M. and Raviv A. (1990), 'Capital structure and the information role of debt', The Journal of Finance, Vol. 45, pp. 321-349

Harris M. and Raviv A. (1991), 'The Theory of Capital Structure', The Journal of Finance, Vol. 46, NO. 1 pp. 297-355

Haugen R. A. and Senbet L. M. (1986), 'Corporate Financial and Taxes', A Review Financial Management, Vol. 15, NO.3 pp. 5-32

Hayne E. L. (1998), 'Agency Costs, Risk Management, and Capital Structure', The Journal of Finance, Vol. 53, NO, 4, pp. 1213-1243

Hill R. C. Griffiths W. l. and Lim G. C. (2012), Principles of Econometrics, John Wiley and Sons, Asia

Hsiao C. (1985), 'Benefits and Limitations of Panel Data', Econometric Review, Vol. 4, pp. 121-174

Hsiao C. (2003), Analysis of Panel Data, Cambridge University Press, Cambridge

Huang G. and Song F. M. (2005), 'The determinants of capital structure: Evidence from China', Proceedings of China Economic Review, North-Holland, pp. 14-36

Jensen M. S. (1986), 'Agency problems of free cash flow, corporate finance and takeovers', American Economic Review, Vol. 76, NO. 2 pp. 323-329

Jonathan B. and Peter D. (2011), Corporate Finance, Prentice Hall, Boston

Jonathan B. B. and Paul J. M. (1997), A History of Corporate Finance, Cambridge University Press, Cambridge, Journal of business finance and accounting, Vol. 20, NO. 1 pp. 83-98

Karadeniz E. S., Kandir Y., Balcilar M. and Onal Y. B. (2009), 'Determinants of capital structure: evidence from Turkish loding companies', International Journal of Contemporary Hospitality Management, Vol. 21, NO. 5 pp. 594-609

Kraus A. and Lizenberger R. H. (1973), 'A state-Preference Model of Optimal Financial Leverage', The Journal of Finance, Vol. 28, NO.4 pp. 911-922

Miguel A. and Pindadp J. (2001), 'Determinants of capital structure: new evidence from Spanish panel data', The Journal of corporate Finance, Vol. 7, pp. 77-99

Modigilani F. and Miller M. (1986), 'Corporate Income Taxes and the Cost of Capital, A Correction', The American Economic Review, Vol. 53, pp. 433-443

Modigiliani F. and Miller M. (1958), 'The Cost of Capital, Corporate Finance and The Theory of Investment', The American Economic Review, Vol. 48 N0. 3 pp-216-297

Moore T. W. (1986), 'Asset composition, Bankruptcy costs and the firm's choice of capital structure', The Quarterly Review of Economics and Business, Vol. 25, pp. 4-51

Myers S. C. (1977), 'Determinants of Corporate Borrowing', The Journal of Financial Economics, Vol. 5, pp. 147-175

Myers S. C. (1984), 'The Capital Structure Puzzle', The Journal of Finance, Vol. 39, pp. 575-592

Myers S. C. (2001), 'Capital structure', The Journal of Economic Perspectives, Vol. 15, pp. 81-102

Myers S. C. and Majluf N. S. (1984), 'Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have', The Journal of Financial Economics, Vol. 13, pp. 187-211

Ozkan A. (2001), 'Determinants of Capital Structure and Adjustment to Long Run Target: Evidence from UK Company Panel Data', The Journal of Business Finance and Accounting, Vol. 28 pp. 175-198

Rajan R. G. and Zingales L. (1995), 'What Do We Know about Capital Structure? Some Evidence from International Data', The Journal of Finance, Vol. 50, NO. 5 pp. 1421-1460

Richard A. B., Myers S. C. and Franklin A. (2008), Principles of Corporate Finance, McGraw-Hill, New York

Ross S. A. (1977), 'The Determination of Financial Structure: The

Incentive-Signalling Approach', The Bell Journal of Economics, Vol.8, NO. 1 pp. 23-40

Ross S. A. (1985), 'Debt and Taxes and Uncertainty', The Journal of Finance, Vol 40, NO.3 pp. 637-657

Ross S. A., Westerfield R. W. and Jaffe J. (2008), Corporate Finance, 8th Ed., McGraw-Hill Irwin, New York

Sanjay B., (2013), Corporate Finance, University of Nottingham

Scott J. H. (1976), 'A Theory of Optimal Capital Structure', The Bell Journal of Economics Vol. 7, NO. 1 pp. 33-54

Shyam-Sunder L. and Myers S. C. (1998), 'Testing static tradeoff against pecking order models of capital structure', The Journal of Financial Economics, Vol. 51 pp. 219-244

Smith C. (1977), 'Option Pricing a Review', The Journal of Financial Economics

Smith C. and Warner J. (1979), 'On financial contracting: An analysis of bond covenants', The Journal of Financial Economics, Vol. 7, pp. 117-161

Smith C. and Watts R. (1992), 'The investment Opportunity Set, and Corporate Financing, Dividend and Compensation Policies', The Journal of Financial economics, Vol. 32, NO. 3 pp. 263-292

Stein F. 'Capital Structure Theories and Empirical Test: An overview', proceedings of the Trondheim Business School, pp. 129-149

Taggart R. A. Jr. (1977), 'A Model of Corporate Financing Decisions', The Journal of Finance, Vol. 32, NO. 4 pp. 1467-1484

Titman S. (1984), 'The Effect of Capital Structure on a firm's Liquidation Decision', The Journal of Finance, Vol. 13, pp. 137-151

Titman S. and Wessels R. (1988), 'The Determinants of Capital Structure Choice', The Journal of Finance, Vol. 53, No. 1 pp. 1-19

Waner J. B. (1977), 'Bankruptcy Costs: Some Evidence', The Journal of Finance, Vol. 32, NO. 2 pp. 337-347

White H. (1980), 'A Heteroskedasticity-cosistent Covariance Matrix Estimator and a Direct Test for Heteroskedasiticity', Econometrics, Vol. 48, pp. 817-838

William L. M., Scott B. S. and Lawrence J. G. (2007), Corporate Finance, Thomson, Canada

Appendices

STATA output

1, summarized statistics

```
. summarize
```

Variable	Obs	Mean	Std. Dev.	Min	Max
company	0				
year	1892	2007.557	2.865479	2003	2012
code	1892	96.75687	55.81699	1	193
ltd	1892	.1750851	.1280496	0	.7391087
std	1892	.1133681	.0861607	0	.5037457
ndts	1892	.0436582	.0223078	.0027197	.2141168
size	1892	9.541216	7.162113	-26.64	49.96
gro	1892	4.865682	3.180465	0	26.16
ta	1892	.344286	.1795787	0	.9495911
liquidity	1365	61.56938	345.7952	-833.7649	7680.556
pro	1892	.0610932	.0609237	-.189062	.6374222
industry	1892	3.681818	2.151636	1	10

.

2, Result of ANOVA analysis

2.1 Descriptive industry statistics

```
. tab industry, gen(id)
```

INDUSTRY	Freq.	Percent	Cum.
1	416	21.99	21.99
2	16	0.85	22.83
3	659	34.83	57.66
4	201	10.62	68.29
5	277	14.64	82.93
6	139	7.35	90.27
7	94	4.97	95.24
9	40	2.11	97.36
10	50	2.64	100.00
Total	1,892	100.00	

.

2.2 Long term debt with dummy variables

```
. oneway ltd industry, t
```

INDUSTRY	Summary of LTD Mean	Std. Dev.	Freq.
1	.14766172	.08274121	416
2	.08938979	.03304876	16
3	.16590568	.11009721	659
4	.28831616	.18447392	201
5	.17596301	.09021238	277
6	.11415731	.09868792	139
7	.07635366	.13329763	94
9	.23572894	.12559805	40
10	.39808103	.08804438	50
Total	.17508508	.12804957	1892

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	7.12892985	8	.891116231	70.28	0.0000
Within groups	23.8772169	1883	.012680413		
Total	31.0061467	1891	.016396693		

```
Bartlett's test for equal variances:  chi2(8) = 266.2590  Prob>chi2 = 0.000
```

2.3 Regression between long term debts with industry dummies

```
. reg ltd id1 id2 id3 id4 id5 id6 id7 id8 id9
note: id8 omitted because of collinearity
```

Source	SS	df	MS
Model	7.12892985	8	.891116231
Residual	23.8772169	1883	.012680413
Total	31.0061467	1891	.016396693

```
Number of obs =    1892
F(  8,  1883) =   70.28
Prob > F      =  0.0000
R-squared     =  0.2299
Adj R-squared =  0.2266
Root MSE      =  .11261
```

ltd	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
id1	-.0880672	.0186411	-4.72	0.000	-.1246267	-.0515078
id2	-.1463392	.0333097	-4.39	0.000	-.211667	-.0810114
id3	-.0698233	.0183372	-3.81	0.000	-.1057866	-.0338599
id4	.0525872	.0194961	2.70	0.007	.014351	.0908234
id5	-.0597659	.019047	-3.14	0.002	-.0971214	-.0224105
id6	-.1215716	.0202049	-6.02	0.000	-.1611979	-.0819454
id7	-.1593753	.0212581	-7.50	0.000	-.2010673	-.1176833
id8	0	(omitted)				
id9	.1623521	.0238876	6.80	0.000	.1155031	.2092011
_cons	.2357289	.0178048	13.24	0.000	.2008098	.2706481

2.4 Short term debt with dummy variables

```
. oneway std industry, t
```

INDUSTRY	Summary of STD Mean	Std. Dev.	Freq.
1	.11840667	.09658386	416
2	.0769858	.0627543	16
3	.12110968	.07879184	659
4	.09324392	.06775316	201
5	.15281066	.0909313	277
6	.0850069	.08313215	139
7	.04141493	.06802065	94
9	.07833046	.05620855	40
10	.08558959	.03052321	50
Total	.11336811	.08616067	1892

Analysis of Variance

Source	SS	df	MS	F	Prob > F
Between groups	1.26972539	8	.158715674	23.41	0.0000
Within groups	12.7684185	1883	.006780891		
Total	14.0381439	1891	.007423662		

Bartlett's test for equal variances: chi2(8) = 116.4084 Prob>chi2 = 0.000

2.5 Regression between short term debts with industry dummies

```
.
. reg std id1 id2 id3 id4 id5 id6 id7 id8 id9
note: id8 omitted because of collinearity
```

Source	SS	df	MS		
Model	1.26972539	8	.158715674	Number of obs	= 1892
Residual	12.7684185	1883	.006780891	F(8, 1883)	= 23.41
				Prob > F	= 0.0000
Total	14.0381439	1891	.007423662	R-squared	= 0.0904
				Adj R-squared	= 0.0866
				Root MSE	= .08235

std	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
id1	.0400762	.0136317	2.94	0.003	.0133414	.066811
id2	-.0013447	.0243583	-0.06	0.956	-.0491168	.0464275
id3	.0427792	.0134094	3.19	0.001	.0164804	.0690781
id4	.0149135	.0142569	1.05	0.296	-.0130474	.0428744
id5	.0744802	.0139285	5.35	0.000	.0471634	.101797
id6	.0066764	.0147752	0.45	0.651	-.022301	.0356539
id7	-.0369155	.0155454	-2.37	0.018	-.0674036	-.0064275
id8	0	(omitted)				
id9	.0072591	.0174683	0.42	0.678	-.027	.0415183
_cons	.0783305	.0130201	6.02	0.000	.0527952	.1038657

3, Correlation Matrix

```
. corr ltd std ndts size gro ta liquidity pro
(obs=1365)
```

	ltd	std	ndts	size	gro	ta	liquid~y	pro
ltd	1.0000							
std	0.3093	1.0000						
ndts	0.1043	0.0160	1.0000					
size	-0.0107	-0.3271	0.2632	1.0000				
gro	0.1125	-0.0108	0.5033	0.2639	1.0000			
ta	0.5421	0.1810	0.3391	0.2230	0.4168	1.0000		
liquidity	-0.0964	-0.0696	0.0101	0.0292	0.0062	-0.0903	1.0000	
pro	-0.3280	-0.3248	0.0108	0.5414	0.1433	-0.1273	0.2282	1.0000

4, Heteroscedasticity test

4.1 Tests for long term debt

```
. estat vif
```

Variable	VIF	1/VIF
pro	1.72	0.583060
size	1.71	0.585514
gro	1.55	0.647111
ndts	1.44	0.695467
ta	1.39	0.718352
liquidity	1.07	0.931814
Mean VIF	1.48	

```
.
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of ltd

         chi2(1)      =     4.73
         Prob > chi2  =   0.0296
```

4.2 Tests for short term debt

```
. estat vif
```

Variable	VIF	1/VIF
pro	1.72	0.583060
size	1.71	0.585514
gro	1.55	0.647111
ndts	1.44	0.695467
ta	1.39	0.718352
liquidity	1.07	0.931814
Mean VIF	1.48	

```
.
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of std

         chi2(1)      =   103.77
         Prob > chi2  =   0.0000
```

5, Breusch-Pagan LM test: Pooled OLS Model and Random Effect Model

5.1 Tests for long term debt

```
.
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        ltd[code,t] = Xb + u[code] + e[code,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                 ltd     |     .015439       .1242536
                   e     |    .0017271       .0415586
                   u     |    .0079377       .0890938

        Test:   Var(u) = 0
                                chibar2(01) =  2570.80
                            Prob > chibar2 =   0.0000
```

5.2 Tests for short term debt

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        std[code,t] = Xb + u[code] + e[code,t]

        Estimated results:
                         |       Var      sd = sqrt(Var)
                ---------+------------------------------
                     std |      .006487        .0805421
                       e |     .0011546          .03398
                       u |     .0040577        .0636997

        Test:   Var(u) = 0
                                 chibar2(01) =  2384.75
                              Prob > chibar2 =   0.0000
```

6, Hansuman Test: Fixed Effects Model and Random Effects Model

6.1 Tests for long term debt

```
. hausman fixed

Note: the rank of the differenced variance matrix (5) does not equal the number of
        coefficients being tested (6); be sure this is what you expect, or there may be
        problems computing the test.  Examine the output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.

                 ---- Coefficients ----
                 |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                 |    fixed            .       Difference          S.E.
-----------------+------------------------------------------------------------
            ndts |   1.265751     .8726768       .3930746        .0596472
            size |    .0000133    .0001037      -.0000903        .0000788
             gro |   -.0027297   -.0034538       .0007242         .000135
              ta |    .0152803    .2310754      -.2157951        .0345405
       liquidity |   -5.23e-06   -4.97e-06      -2.66e-07               .
             pro |    -.320413   -.3460975       .0256846               .
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       35.41
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

6.2 Tests for short term debt

```
. hausman fixed

Note: the rank of the differenced variance matrix (5) does not equal the number of
        coefficients being tested (6); be sure this is what you expect, or there may be
        problems computing the test.  Examine the output of your estimators for anything
        unexpected and possibly consider scaling your variables so that the coefficients are
        on a similar scale.

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |    fixed            .          Difference          S.E.
-------------+------------------------------------------------------------
        ndts |   .3215141      .168975       .1525391        .0563913
        size |  -.0014557    -.0017324       .0002767        .0000854
         gro |   .0003501     .0000408       .0003093        .0001495
          ta |  -.0309735     .0514661      -.0824396         .029965
   liquidity |   8.59e-07     3.55e-07       5.04e-07        4.50e-07
         pro |  -.0067361      -.02679       .0200538         .00367
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =       52.86
                Prob>chi2 =      0.0000
                (V_b-V_B is not positive definite)
```

7, Fixed effect model (F-test is carried out when running fixed effect model and is presented in the last line)

7.1 Long term debt

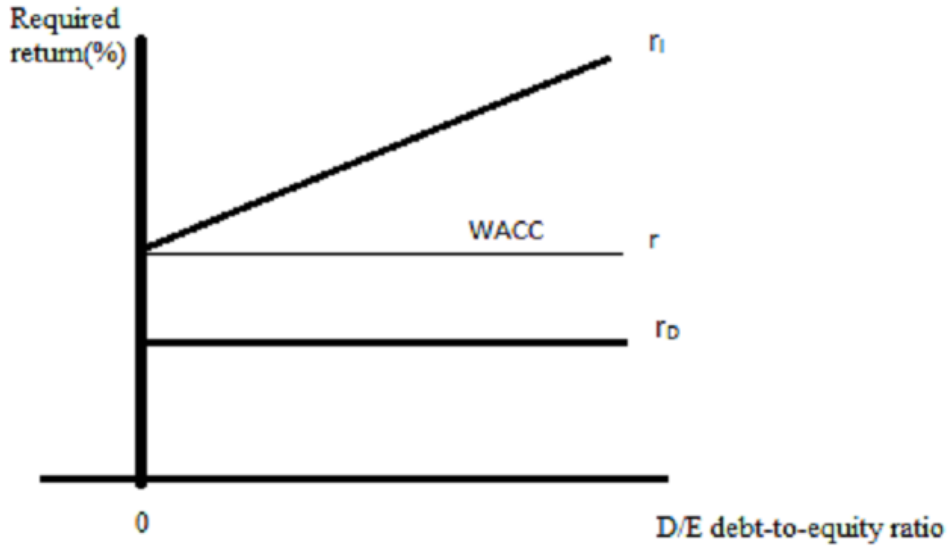
```
. xtreg ltd ndts size gro ta liquidity pro, fe

Fixed-effects (within) regression               Number of obs      =      1365
Group variable: code                            Number of groups   =       190

R-sq:  within  = 0.1750                         Obs per group: min =         4
       between = 0.0696                                        avg =       7.2
       overall = 0.0799                                        max =        10

                                                F(6,1169)          =     41.33
corr(u_i, Xb)  = 0.0344                         Prob > F           =    0.0000

------------------------------------------------------------------------------
         ltd |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ndts |    1.265751   .1472859     8.59   0.000     .9767772    1.554726
        size |    .0000133   .0003588     0.04   0.970    -.0006906    .0007173
         gro |   -.0027297   .0006656    -4.10   0.000    -.0040356   -.0014237
          ta |    .0152803   .0463673     0.33   0.742     -.075692    .1062527
   liquidity |   -5.23e-06   4.68e-06    -1.12   0.264    -.0000144    3.96e-06
         pro |    -.320413   .0391068    -8.19   0.000    -.3971403   -.2436857
       _cons |    .1425222    .015078     9.45   0.000     .1129391    .1721052
-------------+----------------------------------------------------------------
     sigma_u |   .11343833
     sigma_e |   .04155862
         rho |    .8816667   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(189, 1169) =    34.42                 Prob > F = 0.0000
```

7.2 short term debt

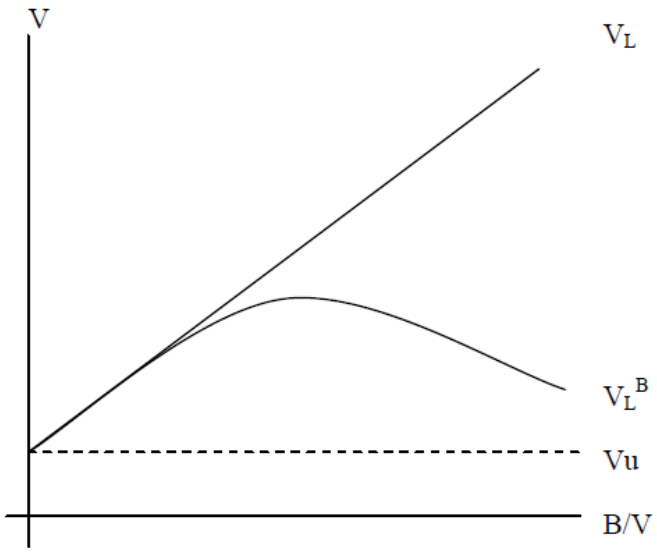
```
.
. xtreg std ndts size gro ta liquidity pro, fe

Fixed-effects (within) regression               Number of obs      =      1365
Group variable: code                            Number of groups   =       190

R-sq:  within  = 0.0351                         Obs per group: min =         4
       between = 0.0430                                        avg =       7.2
       overall = 0.0420                                        max =        10

                                                F(6,1169)          =      7.09
corr(u_i, Xb)  = 0.0639                         Prob > F           =    0.0000

------------------------------------------------------------------------------
         std |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        ndts |   .3215141   .1204268     2.67   0.008     .0852372    .5577909
        size |  -.0014557   .0002934    -4.96   0.000    -.0020313   -.0008801
         gro |   .0003501   .0005442     0.64   0.520    -.0007177    .0014179
          ta |  -.0309735   .0379117    -0.82   0.414    -.1053561    .0434092
   liquidity |   8.59e-07   3.83e-06     0.22   0.823    -6.66e-06    8.37e-06
         pro |  -.0067361   .0319753    -0.21   0.833    -.0694714    .0559992
       _cons |   .1149265   .0123284     9.32   0.000     .0907382    .1391148
-------------+----------------------------------------------------------------
     sigma_u |  .07240579
     sigma_e |  .03397999
         rho |  .81950967   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(189, 1169) =    26.81           Prob > F = 0.0000
```

List of GRAPH and TABLE

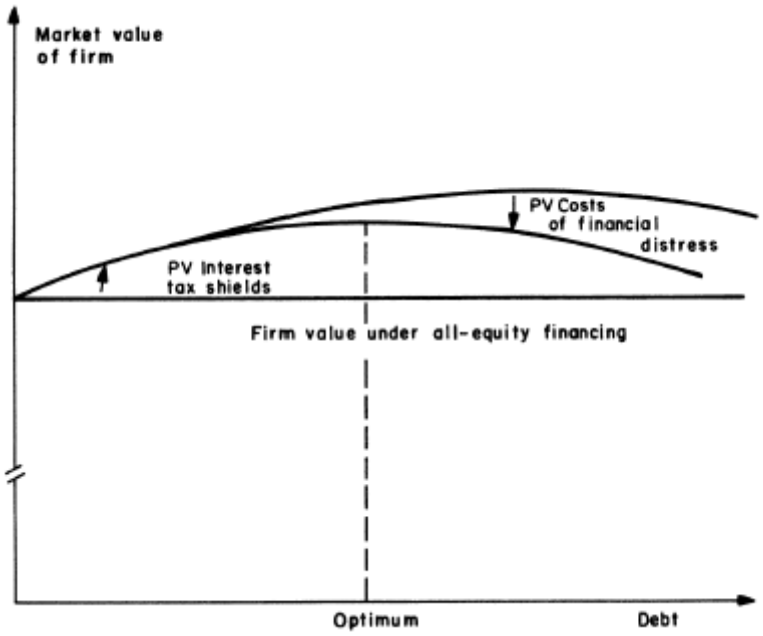
GARPY 1: MM proposition two Illustrated (William L. M. et. al., 2007)



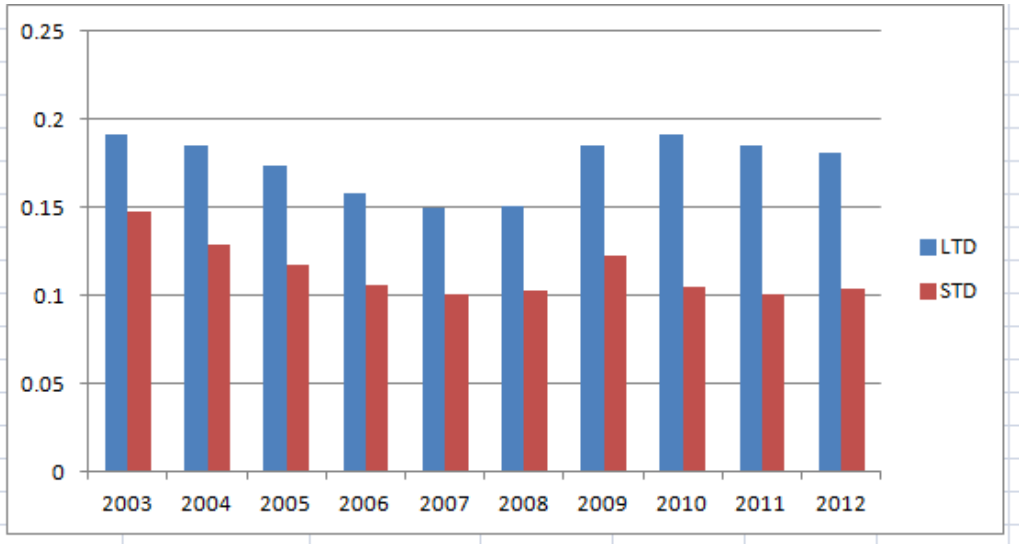
GRAPH 2: Capital structure with bankruptcy cost in trade-off theory (Sanjay B., 2013)



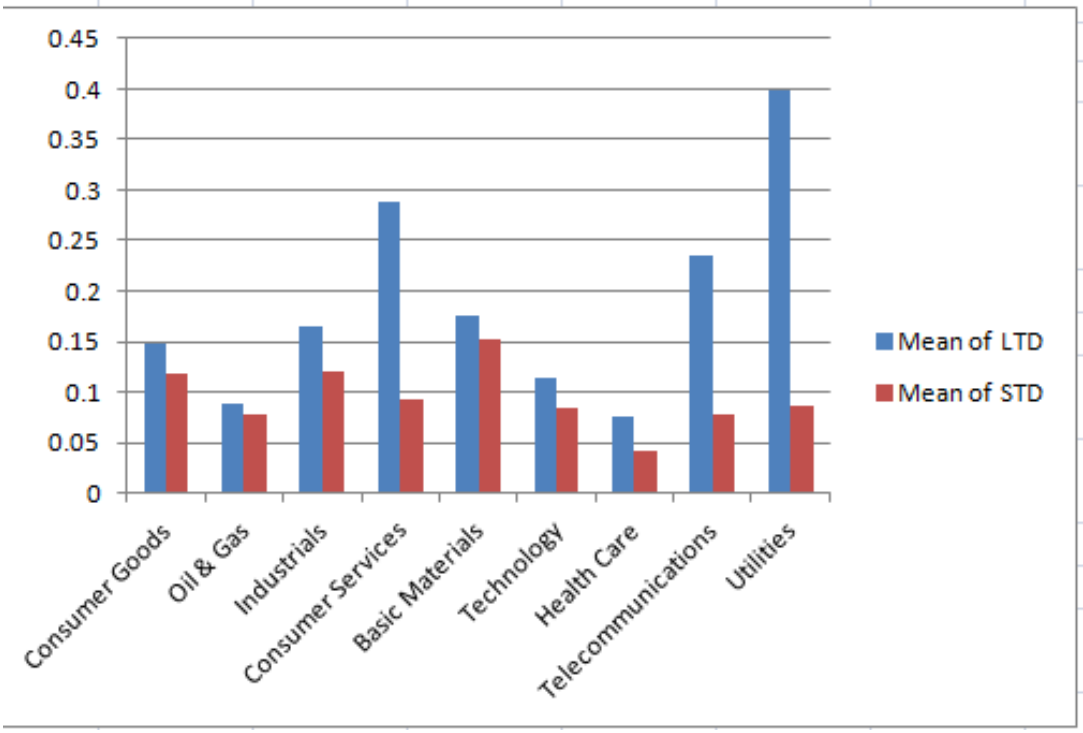
GRAPH 3: Optimal capital structure in trade-off theory (Myers S., 1984)



GRAPH 4: The differences between long term debt and short term debt from 2003 to 2012



GRAPH 5: The trend of firms to finance the capital structure with long term debt and short term debt



Table

TABLE 1: The summary of industry characteristics

Industry	Frequency	Percentage
Consumer Goods	416	21.99
Oil & Gas	16	0.85
Industrials	659	34.83
Consumer Services	201	10.62
Basic Materials	277	14.64
Technology	139	7.35
Health Care	94	4.97
Telecommunications	40	2.11
Utilities	50	2.64
Total	1892	100

TABLE 2: The summary of Independent variables

Independent variables	Observation	Mean	Standard deviation
NDTS	1892	0.0436582	0.223078
SIZE	1892	9.541216	7.162113
GRO	1892	4.865682	3.180465
TA	1892	0.344286	0.1795787
LIQUIDITY	1365	61.56938	345.7952
PRO	1892	0.0610392	0.0609237

TABLE 3: The summary of dependent variables

Dependent variable	Observation	Mean	Standard deviation
LTD	1892	0.1750851	0.1280496
STD	1892	0.1133681	0.0861607

TABLE 4: Results of ANOVA

Type of leverage	F value	Prob > F (p value)
Long term debt leverage	70.28	0.0000
Short term debt leverage	23.41	0.0000

TABLE 5: The coefficients from ANOVA

	LTD	STD
Consumer Goods	-0.0880672 (0.000)	0.400762 (0.003)
Oil & Gas	-0.1463392 (0.000)	-0.0013447 (0.956)
Industrials	-0.0698233 (0.000)	0.0427792 (0.001)
Consumer Services	0.0525872 (0.000)	0.0149135 (0.001)
Basic Materials	-0.057659 (0.007)	0.0744802 (0.296)
Technology	-0.1215716 (0.002)	0.0066764 (0.000)
Health Care	-0.1593753 (0.000)	-0.0369155 (0.651)
Telecommunications	0 (omitted))	0 (omitted)
Utilities	0.1623521 (0.000)	0.0072591 (0.678)
Constant	0.235789 (0.000)	0.0783305 (0.000)
R^2	0.2299	0.0904
Number of observations	1892	1892

TABLE 6: The summary of mean of long term debt and short term debt

	Mean of LTD	Mean of STD
Consumer Goods	0.14766172	0.11840667

Oil & Gas	0.08938979	0.0769855
Industrials	0.16590568	0.12110968
Consumer Services	0.28831616	0.09324392
Basic Materials	0.17596301	0.15281066
Technology	0.11415731	0.0850069
Health Care	0.07635366	0.04141493
Telecommunications	0.2357894	0.07833046
Utilities	0.39808103	0.08558959

TABLE 7: The result from multi-colinearity test

	LTD	STD	NDTS	SIZE	GRO	TA	LIQUIDITY	PRO
LTD	1.0000							
STD	0.3093	1.0000						
NDTS	0.1043	0.0160	1.0000					
SIZE	-0.0107	-0.3271	0.2632	1.0000				
GRO	0.1125	-0.0108	0.5033	00.2639	1.0000			
TA	0.5421	0.1810	0.3391	0.2230	0.4168	1.0000		
LIQUIDITY	-0.0964	-0.0696	0.0101	0.0292	0.0062	-0.0903	1.0000	
PRO	-0.3280	-0.3248	0.0108	0.5414	0.1433	-0.1273	0.2282	1.0000

TABLE 8: The result from Breusch-Pagan test

	LTD	STD
P-value	0.0296	0.0000

TABLE 9: The result from F-test

	LTD	STD
P-value	0.0000	0.0000

TABLE 10: The result from Breusch-Pagan LM test

	LTD	STD
P-value	0.0000	0.0000

TABLE 11: The result from Hausman Test

	LTD	STD
P-value	0.0000	0.0000

TABLE 12: The result of fixed effects model

	LTD	STD
NDTS	1.265751 (0.000)	0.3215141 (0.008)
SIZE	0.0000133 (0.970)	-0.0014557 (0.000)
GRO	-0.0027297 (0.000)	0.0003501 (0.520)
TA	0.0152803 (0.742)	-0.0309735 (0.414)
LIQUIDITY	-5.23e-06 (0.264)	8.59e-07 (0.823)
PRO	-0.320413 (0.000)	-0.0067361 (0.833)
Constant	0.1425222 (0.000)	0.1149265 (0.000)
Fixed effects	0.11343833	0.27240579
R^2	0.1750	0.0351
Number of observations	1365	1365