A Study of Characteristics and Determinants of Capital Structure in the US Context

By

Musha Tian

MSc Finance and Investment

A Study of Characteristics and Determinants of Capital Structure in the US Context

A Dissertation Submitted in Part-fulfilment of the Requirement for the Degree of MSc in Finance and Investment of the University of Nottingham

By

Musha Tian

September 2013

Table of Contents

List of Tables

List of Figures

Acknowledgements

First, I would like to extend the greatest gratitude and appreciation to my supervisor, Professor Sanjay Banerji for his guidance and suggestions on this paper.

Then I would like to thank all lecturers and staffs of Business School in the University of Nottingham for their help.

Finally, I would like to thank my family and friends for their love and support for my UK study and life.

Abstract

This paper aims to explore the characteristics and determinants of capital structure of listed US companies. Mainly three key theories on capital structure (the static trade-off theory, the pecking order theory and the agency cost theory) are discussed specifically. The predicted relevant determinants are analysed and evaluated. Employing the balanced panel data methodology, the capital structure determinants of 266 companies from Standard & Poor's 500 Index for the time period of 1998-2012 are examined critically. Nine potential determinants of US listed companies' capital structure that will be examined are non-debt shields, bankruptcy costs, tangibility, profitability, growth, size, liquidity, free cash flow, and industry type. The evidence from the empirical findings have indicated the theories of capital structure explain the US listed firms' gearing ratio to certain extent. However, the empirical results demonstrate a relative disparity between the empirical result and theoretical prediction on some variables. It is shown that the tangibility, profitability, growth and bankruptcy costs are statistically significant, so they are regarded as important determinants for US listed firms' financial leverage. However, not all explanatory variables are significant. There is not enough evidence to demonstrate the determinants, non-debt shields, size, liquidity, free cash flow and industry type play a key role in the firms' capital structure decisions with 5% significance level. This paper has several drawbacks, consisting of data availability, firm selection and certain factors not taken into consideration. More rigorous empirical tests are required.

Key words: Capital structure, determinants, financial leverage ratio, US listed companies, Trade-off theory, Pecking order theory, Agency cost theory

1. Introduction

It is argued that the Modigliani and Miller (1958)'s proposition that a company's market value is irrelevant with its capital structure attracts considerable publicity. The capital structure, is defined as the mix of various types of securities (long-term debt, common stock, and preferred stock) issued by a firm to finance its assets (Song, 2005). Financial leverage or gearing refers to the extent to which a firm relies on debt, the more debt financing a firm uses in its capital structure, the more financial leverage it employs (Ross, *et al*., 2008). A firm with debt in its capital structure is regarded as leveraged. The proportion of debt and equity are observed on the right-hand side of companies' balance sheets. An optimal capital structure is essential for companies raising a given amount of funds, since it minimizes the firm's composite cost of capital and maximizes the whole firm's common stock price. Capital costs are implied to share a common characteristic with other costs such as manufacturing costs, in that they potentially reduce the size of the cash dividend that could be paid to common stockholders and the size of interest associated with principles paid to debt holders (Megginson, 2007). Then companies with costs being reduced would face greater competitive pressure in product markets and would have a greater incentive and hence a greater tendency to do so. Therefore it makes economic sense to find company's potential characteristics and determinants of capital structure and strive to minimize the capital costs.

The debt and equity securities seem substitutable. Friedman (1982) investigates the degree of substitutability by applying fundamental relationships linking portfolio choices with expected asset returns from the observed variance-covariance structure of US asset returns, using

quarterly data for 1960-80. The resulting evidence consistently shows that long-term debt and equity are substitutes, with the associated substitution elasticity approximately clustered around the value of -0.035. This result conforms to the standard assumptions underlying many models, but this small magnitude of the elasticity of substitution shows that some models' important conclusions do not follow (Eckbo, 2008). This paper will evaluate whether the optimal capital structure exists.

This paper is structured as follows. Section 2 (Literature Review) will first examine the most prominent theoretical and empirical findings on the theory of capital structure in details, consisting of trade-off theory, agency cost theory and pecking order theory. Then based on the theoretical and empirical evidences, every potential determinant will be proposed and evaluated critically. The testable hypotheses for each determinant will be shown. The previous evidence on developed countries and developing countries are compared. Section 3 (Methodology) will outline the data description and the balanced panel data model, then the summarized statistics of variables will be discussed, such as mean, standard deviation, and the correlations between determinants. The financial leverage of different industries will also be assessed. Section 4 (Results and Analyses) will conduct a corresponding statistical analysis on 266 US listed companies from five industries (Industrials industry, Information Technology industry, Materials industry, Utility industry, and Consumer Goods industry), and test how these explanatory variables influence the extent of leverage, the dependent variables. It will also discuss some drawbacks and limitations of the model. Section 5 (Conclusion) will draw a conclusion on this paper.

2. Literature review

2.1 Introduction

Most of the studies have evaluated the capital structure theories and realized that the fewer of the theories have much advocacy (Frank and Goyal, 2003). According to Myers (2001), there is no universal theory of the equilibrium financial leverage, and no reason to expect one. It is suggested that capital structure decisions play a key role in the weighted average cost of capital (WACC) of the firm and the market value of the firm (Shah and Khanm, 2007). This section will outline three main theories on capital structure. These theories put relatively different emphasis on the determinants that could influence the choice between debt and equity. These factors consist of asymmetric information, agency costs, taxes, bankruptcy costs and the effects of market imperfections or regulatory constraints. Like most research, this paper assumes the companies are public, non-financial firms raising capital mainly from outside investors, not from inside investors, such as employees, managers, and entrepreneurs. Moreover, it is assumed that firms can access to "Anglo-Saxon" capital markets, in which markets are broad and efficient for securities, and outside investors are protected well.

2.2 Development of capital structure theories

2.2.1 Modigliani and Miller theories

The Modigliani and Miller (1958)'s irrelevance theory proposes the firm's value does not depend on the capital structure, which means the firm's value is dependent on the profitability of firms' assets and not on how the firms' assets are financed by equity or debt. Therefore, there is no need adjusting the capital structure because it will have no effect on the firms'

value. The Modigliani and Miller (1958)'s irrelevance theory assumes the firms' financing decisions are independent of the investing decision. Additionally, the capital market is perfect, which is featured with no transaction costs, no corporate and personal taxes, no bankruptcy costs, symmetric information and investors can borrow at the same rate as firms. It is also assumed that the managers act only on the behalf of shareholders. Specifically, no bankruptcy costs means the debt is risk-free regardless of the amount used. Therefore, if the firm's value changes as the financial leverage ratio alters, there is an opportunity of arbitrage. Secondly, Modigliani and Miller (1958) propose another argument that the required rate of return on equity increases as the financial leverage ratio increases (Brealey *et al*., 2003).

In 1963, Modigliani and Miller's theory is expanded by adding the corporate income taxes. The optimal capital structure is to have 100 percentage of debt because of the tax deductibility of interest payments. The tax shield effect allowing interest payments to be tax deductible should be taken into consideration. It is argued that the 100% debt financing is optimal. Because the more debt a firm's capital structure consists of, the less tax it will pay and more capital for shareholders and debt holders. There are several assumptions for Modigliani and Miller's irrelevance theory with tax. For instance, tax is deductible, and debt is perpetuity. This theory is supported by Stiglitz (1969), who maintains that it is significant when some assumptions are excluded in the model, such as bankruptcy costs, borrowing rate and lending rate are the same. Nevertheless, Hirshleifer (1966) argues that the optimal capital structure exists when the MM assumptions are eliminated from the model.

Following Modigliani and Miller's seminal papers in 1958 and 1963, firm financial leverage or capital structure attracts much attention. Thirty-seven years later, Rajan and Zingales (1995) recognise the most important departures from the Modigliani and Miller's assumptions. The most famous theories of capital structure are the trade-off or target capital theory, the pecking order theory and the agency cost theory. Generally, these alternatives arise from the circumstances when Modigliani and Miller's assumptions are violated, like the existence of signalling and asymmetric information (for example, Myers and Majluf, 1984; Ross, 1977; Myers, 1984), agency costs (for example, Jensen and Meckling, 1976; Jensen, 1986) and bankruptcy costs (for example, Warner, 1977). In US, where the capital market is imperfect, all these factors may affect firms' decisions in issuing equity and borrowing.

2.2.2 Static Trade-off theory (target capital theory)

Being proposed by Kraus and Litzenberger (1973), the trade-off theory treats firms' leverage decision as a balance between interest tax shields benefits of debt and costs of bankruptcy or financial distress. Therefore, actual debt ratios move towards the optimum targets. Like the proposition put forward by Modigliani and Miller, when a firm incurs debt on which it pays interest, it is tax deductible, which reduces the cost of debt to the firm by an amount equal to the reduced taxes the firm must pay, this constitutes an advantage of using debt financing rather than equity financing since the dividends paid to stockholders are not tax deductible. Hence, if there were no costs for holding debt, the benefit of interest tax shields would attract firms to hold 100% debt and no equity. After examining the large firms' financial leverage ratio response to changes in corporate tax, Trezevant (1992) and Bradley *et al.* (1984) support this claim.

However, when the financial leverage ratio is high, the company may overextend its ability to service the debt and can be vulnerable to business downturns, which is considered as the risk of financial distress. The costs of bankruptcy tend to decrease the assets value of the firm and the ownership of the firm's assets is transferred from the stockholders to the bondholders. The costs of financial distress depend on the probability that a company will face bankruptcy. The magnitude of the bankruptcy costs constitutes direct costs and indirect costs. The direct cost is incurred in bankruptcy and reorganization, including legal fees, administration costs of liquidation, the costs of shutting down operations and disposing assets. This originates from the fact that shareholders have little incentive to run a bankrupt firm efficiently which may result in the firm's assets being disposed when it comes to bankrupt. Moreover, Cornelli and Felli (1995) indicate that the bankruptcy effect might occur before the firm going bankrupt. Moreover, the possibility of bankruptcy may cause shareholders to engage in excessively risky projects to take wealth from the firm's bondholders. The indirect cost is associated with underinvestment because of the inability to raise new funds, the product-market issues like less advertisement, lost clients, lost suppliers, lost employees or lost market share due to lower quality of product. Furthermore, competitors are becoming more competitive. These derive from the fact that the relevant parties are reluctant to do business with a firm which is at the risk of financial distress (Brealey and Myers, 2003). Moreover, Myers (1984) puts forward that there is a 'debt overhang' problem. This takes place when a firm's debt has risk of default and the requirement in the associated covenants give current debt holders the priority for repayment which will be detrimental to the shareholders. The reason for this is that the value created by new investments will go to debt holders with a reduced credit risk on

currently outstanding debt. The covenants will become stricter as the risk of debt default is extremely high. In this circumstance, since the firm must obey the covenants, it may give up the value-maximizing investments, contributing to the 'underinvestment problem' (Myers, 1977 and Calomiris, *et al*., 1995). Therefore, the assets of firms with high earnings volatility are more likely to drop below the requirement of covenants and incur a higher financial distress cost. These firms have less financial leverage, so the bankruptcy cost is negatively related to the financial leverage ratio (Bradley *et al*., 1984).

Therefore, the curve of capital cost would top out at relatively high debt ratios for profitable firms with plenty of taxes shield and assets whose values would escape serious damage in financial distress (Fama and French, 2002). As the Figure 1 shows, firms' value is maximized by considering the benefits of present value of interest tax shields and costs of present value of financial distress. Therefore, debt should be substituted for equity until the firm value is maximized.

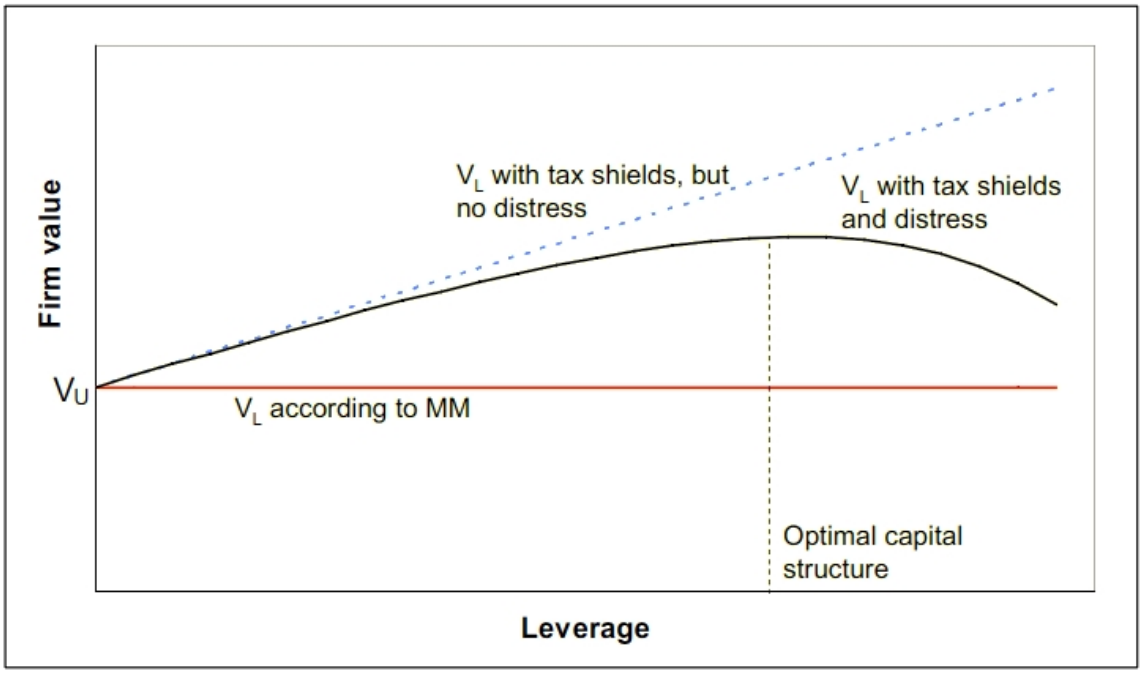


Figure 1 Trade-off theory of capital structure (Myers, 1984)

It is worth noting that the adjustment costs or transaction costs also determine the firms' optimal capital structure (Myers, 1977). It is optimal to make adjustment only when the gains of moving toward or the losses of being away from the target level outweigh the costs of moving back to the target. It is suggested that the adjustment costs seem to stop companies from adjusting financial leverage ratios toward their target ratios. This implies that a partial adjustment toward the target financial leverage ratio exists. Hence, a static capital structure model is not able to obtain the dynamic adjustment in financial leverage ratio, and there is a deviation from the firm's theoretical optimal leverage ratio. This shows the observed empirical leverage ratio is not always optimal. The Section 3 will examine the empirical studies on determinants of capital structure which may influence the adjustment process.

Therefore, facing less financial distress risk, safe firms with mainly tangible assets tend to borrow more than risky firms with primarily intangible assets, such as expenditures on research and development and advertising.

According to the static trade-off theory, high profitable firms seem to borrow more because they have access to more taxable income to shield, and more interest tax shields will be exploited. Moreover, the trade-off theory can explain inter-industry differences better and work better for companies with tangible assets. However, Song (2005) maintains that firms with investment tax credits and substantial tax shields from other sources, such as depreciation, will get less benefit from leverage, which suggests that such non-debt tax shields are substitutes for the tax benefits of debt financing.

However, Auerbach (2002) and Graham (2003) dispute that estimating the sensitivity of the firms' capital structure to tax benefits is difficult, which is attributable to the measurement problem. Moreover, compared with fairly high corporate tax rate, companies' actual bankruptcy costs is significantly lower, so the firms could issue more debt to benefit from the interest tax shield (Maksimovic and Phillips, 1998). Nevertheless, regarding the effect of corporate tax rate on financial leverage ratio, Graham (2000) demonstrates that most large firms with high profitability and liquidity have low gearing ratio and corporations with high corporate tax rate employ debt financing moderately.

2.2.3 Pecking order theory

Originally proposed by Myers (1984) and Myers and Majluf (1984), pecking order theory starts with a company with assets already in place and a growth opportunity requiring additional equity financing. The pecking order theory suggests that there is no optimal capital structure, and changes in leverage ratios are driven by the internal financial deficit. Explaining much more of the time-series variance in actual leverage ratios than a target adjustment model based on the static trade-off theory, pecking order theory demonstrates that financing policies tend to follow a certain hierarchy of preferences: internal financing is preferred to external financing, and debt financing is preferred to equity financing. Myers and Majluf (1984) assume the financial market is perfect, except for asymmetric information, the unrealistic assumptions of Modigliani and Miller (1958)'s, so investors have no access to the true value of either the existing assets or the new opportunity, and they cannot correctly value the shares issued to finance the new investment.

Firstly, a firm with ample internally generated funds does not have to sell any kind of security and thus avoiding issuing costs and information asymmetry problems. Issuing costs contain the transaction costs, flotation costs and costs of disclosing the firm's proprietary financial information. Therefore, there is inverse intraindustry relationship between profitability and financial leverage (Shyam-Sunder and Myers, 1998). Moreover, it is suggested that the announcement of a stock issue will drive down stock price at approximately 3% of the pre-issue market capitalization of the firm (Asquith & Mullins, 1986). Dierkens (1991) utilizes different proxies for information asymmetry to demonstrate the statement that the

decline of the price is greater when the information asymmetry is large. D'Mello and Ferris (2000) agree this by adding that the price decline is much larger for companies followed by fewer security analysts. The price decrease does not include the transaction costs, the underwriting spreads or other stock issue expenses. Therefore, the company that issues new shares is worth less than the corporation that use internally generated funds, and investors downgrade the prices of issuing companies. In one word, the listed corporations' preference for internal financing rather than external financing arise from the avoidance of the "discipline of capital markets" and the information asymmetry due to the separation of ownership and control (Constantinides and Stulz, 2008).

Moreover, since adverse selection problem arises due to the asymmetric information, the signalling effects associated with external funding should be taken into account. When internally generated free cash flow exceeds the capital investment, the decision between debt and equity should be made. Issuing debt rather than equity may minimize the managers' information advantage, acting as a signalling role. Increasing debt may signal managers are optimistic about future prospects, because they believe the current stock price is undervalued. Another reason for managers to choose debt is its prior claim on assets and earnings while the equity is the residual claim. Hence, investors in debt are less exposed to the misvaluation of the firm, so that the announcement of issuing debt seems to have less effect on the price drop than the announcement of issuing equity. The equity issues will be needed only when debt is costly, as issuing equity reveals the managers' pessimism. For instance, when company is already at an extremely high debt ratio where managers and investors can predict the costs of

bankruptcy, the equity issues is needed.

It is also argued that pecking order theory is a much better explanation of the leverage ratio for large, mature firm that has access to public bond markets. The characteristics of these companies are that debt is used more than the equity. Debt ratios adjust when the imbalance of internal cash flow occurs, net of dividends and real investment opportunities, whereas the issues considered in the trade off model are considered as the second order. It is argued that many scholars agree the Myers-Majluf (1984)'s idea of pecking order theory, such as Brennan and Kraus (1987), Noe (1988), Constantinides and Grundy (1989), Krasker (1986) and Heinkel and Zechner (1990). However, Frank and Goyal (2003) suggest that pecking order theory is not effective with smaller and younger growth companies. Moreover, Helwege and Liang (1996) criticize that the probability of obtaining external funds has no relationship with the shortage of internally generated funds.

Myers (1984) maintains that firms' reliance on internal generated funds results from the separation of ownership and control, where managers are unwilling to resort to external capital with the intention to avoid the capital market discipline. Consistent with this, Fazzari *et al.* (1988) claim that the availability of free cash flow is another primary factor for US companies to follow the hierarchy.

There are certain exceptions from the pecking order theory. Fama and French (2002) maintain that firms that issue equities to existing stockholders or employees in their compensation plan

can escape from the costs of asymmetric information and transaction costs. Therefore, the need for issuing debt can be reduced. Furthermore, stock option plans for employees are treated as techniques to relieve the conflicts between managers and stockholders. The managers are encouraged to work for stockholders interest. This decreases the need for debt as an instrument for mitigating the agency conflict, as discussed in Section 2.2.4.

There are primarily three drawbacks in the pecking order theory. Firstly, it does not consider the situations in more complicated circumstances, such as the choice between straight debt and convertible debt. Secondly, the motivation for firms to raise capital externally, the shortage of the internal funds, is criticized. It does not take other theories and the institutional factors which may influence the firm's financing choice into consideration, such as the government intervention, the borrower-lender relations and the interest rate (Adedeji, 1998). The government intervention via the monetary policy may cause the borrowing cost to be lower than the cost of internal capital. Thirdly, Baskin (1989), Adedji (1998) and Allen (1993) disprove the argument that the transaction costs and the adverse selection problem encourages companies to follow the pecking order, proposed by Myers (1984) and Myers and Majulf (1984).

To summarize, when the internally generated free cash flow exceeds capital investment, the need for external financing increases, the firm will work down the pecking order from safe to riskier debt and then to equity.

2.2.4 Agency cost theory

Capital structure management also gives rise to agency costs, stemming from conflicts of interest between stockholders, bondholders and managers. This principle-agent problem is regarded as the moral hazard problem, a problem of asymmetric information attributed to the separation of ownership and control. The agent is a party that will act for or on behalf of another party, the principle. The asymmetric information means individuals have imperfect information to the other party's actions and preferences, and agents are better informed than principles. Gillan and Starks (2007) propose that the separation between ownership and control is not the only element that generates agency problems, the diffuse nature of corporate ownership may also trigger the agency problem. The diffuse nature implies no incentive would exist for small shareholders to bear the cost of monitoring the management behaviour. Regarding the conflicts between shareholders and bondholders, shareholders may have incentives to invest in extremely risky projects even with negative NPV, whereas bondholders could logically take a dim view of such an investment policy because changing the risk structure of the firm's assets would change the business-risk exposure, leading to a downward revision of the bond rating, in turn, would lower the current market value of the firms' bonds (Brealey, *et al*., 2008). Moreover, if the investment fails, the lenders are likely to bear the cost as the shareholders have limited liability. Therefore, when the leverage ratio is high, bondholders demand a great deal of monitoring. This increase in agency costs will raise the implicit cost of debt financing (Copeland, *et al*., 2005). Um (2001) emphasizes that firm size may proxy for the debt agency costs, which are lower for large firms than for small firms. Therefore, larger firms will be induced to use more debt than smaller ones. One typical

example is the Madoff fraud in the Wall Street.

Furthermore, Jensen proposes that agency costs also exist between the manager and shareholder, also termed as the financial slack costs. The corporate managers act as the agents for shareholders (the principles). The separation of ownership and control would provide managers with the substantial free cash flow and this can lead to misbehaviour by managers, maximizing their own wealth that are not in the best interests of the firm's common stockholders. Managers may seek private benefits, such as inappropriately high salaries, consuming excessive perquisites, over valuing the investment requirements and over investing in managerially rewarding but not beneficial activities. Serious examples include the incentives of executives to build empires and capture of firms' assets or free cash flow. It is assumed that managers will always invest free cash flow and make entrenching investments, even in negative-NPV projects. Free cash flow is defined by Jensen (1986) as "cash flow in excess of that required funding all projects that have positive NPV when discounted at the weighted average cost of capital". Therefore, when managers have more cash flow than is needed to fund all of the firm's positive NPV projects, they may intend to invest the excess cash in unprofitable projects, this is regarded as the over investment. Accordingly, profitable firms may have high costs of free cash flow. This leads to what Jensen calls "control hypothesis" for using debt as a mechanism to mitigate the agency costs. Since debt is a contract that forces the firm to pay out cash for debt holders to meet its promise, it can decrease the amount of funds available for managers and curb overinvestment. Harris and Raviv (1990) argue debt can be regarded as a disciplining tool, as default grants creditors the

option of driving the firm into liquidation, which means by leveraging up, the firm's shareholders will enjoy increased control over their management team under the threat of financial failure. Moreover, it is proposed that the issuance of debt motivates managers to make better investment decisions (Lasfer, 1995). Therefore, the profitable firms should have more debt, hence, higher financial leverage ratio, to reduce the amount of funds available under management control. In agency cost theory, profitability is positively related to the financial leverage ratio. However, using debt may exacerbate the conflict between shareholders and debt holders. The debt holders may have more control than shareholders.

However, it is more effective for firms with a large amount of free cash flow but poor investment opportunities to enjoy the debt's advantage over equity in mitigating the agency cost, because the probability of investing free cash flow in unprofitable projects for these firms is relatively high (Jensen, 1986). Nevertheless, debt is ineffective in decreasing agency cost for rapidly growing firms which have good investment opportunities but no free cash flow.

In conclusion, the tax advantage of debt should not be the sole reason for using debt (Jensen and Meckling, 1976 and Jensen, 1986). The application of debt also plays a crucial role in decreasing agency costs of stockholder and manager, but the stockholder and bondholder agency costs increase as the financial leverage ratio increases. When it arrives at certain level, agency costs of stockholder and bondholder will outweigh the stockholder and manager agency costs savings. According to Jensen and Meckling (1976), the balance between these

costs leads to an optimal capital structure. In the static trade-off theory discussed above, the stockholders and bondholders agency costs and the shareholders and managers agency costs are not taken into consideration. It is recommended that the modern version of trade-off theory includes balancing among agency costs, bankruptcy costs, and interest tax shields benefits to arrive at the optimal capital structure.

2.2.5 Conclusion

Since there are conflicts among these three theories, it is necessary to find out which theory, the static trade-off theory, the agency cost theory or the pecking order theory generally explains firms' optimal financial leverage. Since the agency cost is incorporated into the modern trade off theory, the trade-off theory includes the agency cost in this section. Comparing the pecking order theory with the static trade-off theory, the results are questionable. Haan and Hinloopen (2003), Gaud *et al.* (2005) and Fama and French (2002) realize both the pecking order and trade-off models play a key role in explaining financing choices of their sample corporations, and both models should be accepted. Taggart (1977) claims that corporations seem to keep a targeted financial leverage ratio, which is in line with the trade-off theory. However, most important empirical studies, like Titman and Wessels (1988), Rajan and Zingales (1995), Baskin (1989) and Chaplinsky and Niehaus (1993) propose that the profitability and internal funds are negatively correlated with financial leverage ratios. This is consistent with the pecking order theory but contradicts what is proposed in the trade-off theory. Moreover, through analysing the statistical power of alternative hypotheses, Myers (1984) argues that the pecking order theory has greater time series explanatory power than the static trade-off model, and the trade-off model can be

rejected.

However, Chirinko *et al.* (2000) suggest that this test produces misleading conclusions and that their empirical evidence cannot examine the pecking order theory or the static trade-off theory. Moreover, Booth *et al.* (2001) estimate that it is unlikely to distinguish these two models because factors describing one model may also be employed to explain the other model's variables. Therefore, some recent empirical studies have used several variables which can be justified using any of these two models via cross-sectional tests.

To summarize, it is suggested that no capital structure theory is superior to another. It ranges from irrelevance theory of capital structure, proposed by Modigliani and Miller (1958), to several relevant theories on capital structure. The static trade-off theory is that if financial leverage can increase a firm value in Modigliani and Miller's tax model, firms have to trade-off between the financial distress costs and interest tax shields. The pecking order theory proposes that changes in leverage ratios are driven by the internal financial deficit and financing policies tend to follow a certain hierarchy of preferences: internal financing, debt financing and equity financing. The agency cost theory suggests that agency costs conflicts exist between shareholders and bondholders and between the manager and shareholder. The debt can be used as a disciplining tool to mitigate the agency costs and the overinvestment, this is regarded as the control hypothesis.

2.3 Theoretical determinants of capital structure

2.3.1 Introduction

It is suggested that no model could summarize all theories about capital structure and it is unlikely for one theory to affect the capital structure of one firm as a whole. Many proxies affect companies simultaneously. For analyses' purpose, the financial leverage ratio acts as the dependent variable for the analysis. There are different measures of financial gearing. In terms of the equity, it is suggested that primarily two categories of equity measures exist, one is the total debt over total debt plus market value of equity (Mittoo and Zhang, 2005 and Doukas and Pantzalis, 2003) and the other is the total debt divided by total debt plus book value of equity (Loof, 2004). This paper will adopt the book value of equity. Considering the debt, the long-term debt is preferred than the short-term debt, because short term debt is more flexible when the partial adjustment model occurs due to the transaction costs and market imperfections. Therefore, this paper will use the long term debt and book value of equity, which is calculated as the ratio of long term debt over book value of equity.

In addition to identify the proxy for the leverage, the determinants of capital structure or financial leverage is also essential. In terms of the independent variables, they appear on the right side of the equality sign, also termed as explanatory variables or endogenous variables. A majority of independent variables have been tested by scholars. According to the time series, some endogenous variables that have been examined empirically are summarized below. In 1982, Marsh (1982) examines tangibility. In 1988, Titman and Wessels (1988) assess firm size. In 1993, Bennett and Donnelly add profitability and growth opportunity. In 1995, Rajan and

Zingales (1995) test tangibility. In 2001, Ozkan (2001) adds liquidity in his paper. All these factors are regarded as firm specific and significant to affect the capital structure. Based on the data availability, nine independent variables will be examined individually, consisting of non-debt shields, bankruptcy costs, tangibility, profitability, size, growth, liquidity and free cash flow. Additionally, to compare the differences in the leverage ratio between different industries, the "industry type" is introduced as a dummy variable. Each of the determinants is examined according to the literature, empirical evidence and prediction results.

The proposed null hypothesis (H_0) is that the coefficient of endogenous variable is equal to zero, while the alternative hypothesis (H_n) is that the slope coefficient of explanatory variable is not equal to zero.

2.3.2 Non-debt shields (NDS)

The debt tax shields in debt financing mentioned in the trade-off model is associated with exploiting the tax deductibility of interest (DeAngelo and Masulis, 1980), so firms will increase debt to benefit from tax shields. However, firms with other tax shields like investment tax credit deduction and depreciation will decrease debt to benefit from tax shields. Furthermore, Angelo and Masulis (1980) put forward that changes in inflation or changes in the corporate tax code which reduces the real value of tax shields may increase the amount of debt employed. These are regarded as non-debt shields. These deductions are substitute for the tax shields, and they have no relation with the method a company chooses to finance its investments. For instance, the stock option plans for employees are interpreted as an

important non-debt tax shield (Graham *et al*., 2004). Firms tend to substitute option deductions for interest deductions. The marginal tax savings from an additional unit of debt will decrease when the NDS exists. Therefore, the NDS is negatively related with leverage. Past empirical research also demonstrates theoretical prediction about their relationship. Gardner and Trzcinka (1992), Bradley *et al.* (1984) and Chaplinsky and Niehaus (1993) find a positive relationship whereas Shenory and Koch (1992), Huang and Song (2002) and Titman and Wessels (1988) suggest a negative relation.

The non-debt shields is measured by

The alternative hypothesis for non-debt tax shields is

H_1: There is a significant negative relation between the leverage ratio and non-debt tax shields.

2.3.3 Bankruptcy costs

In terms of the bankruptcy costs in the trade-off model, Altman (2000) proposes a Z score bankruptcy model, in which bankruptcy risks, which indicates firms facing more bankruptcy risks have larger bankruptcy costs, are proxied with Altman's Z-score:

$$Z = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + 0.999T_5$$

Where:

T_1 signifies Working Capital / Total Assets,

T_2 signifies Retained Earnings / Total Assets,

T_3 signifies Earnings Before Interest and Taxes / Total Assets,

T_4 signifies Market Value of Equity / Total Liabilities,

T_5 signifies Sales/ Total Assets.

In a series of tests covering three periods during 30 years, the Altman model is found to be approximately 80-90% accurate in predicting bankruptcy one year before the event, with a Type II error of about 15%.

The alternative hypothesis for bankruptcy costs is

H_2: There is a significant negative relation between the leverage ratio and bankruptcy costs.

2.3.4 Tangibility

Financial leverage also depends on how easily ownership of assets can be transferred, measured by the variable "Tangibility". It is suggested that tangible or fixed assets can be used as collateral, which means the tangibility of assets is associated with the collateral value of assets. A firm with mostly tangible assets is less subject to information asymmetry, and can be sold without great loss in value when faced with bankruptcy, thus having an incentive to borrow more. Therefore higher tangibility lowers the risk of a creditor and increases the value of the assets, resulting in a positive relationship between tangibility and financial leverage (Bauer, 2004). This positive relationship is consistent with the prediction of Jensen and

Meckling's (1976). Regarding the agency costs arising from the information asymmetry, new equity issued may be underpriced which contributes to the underinvestment problems. Therefore, debt issuance secured by tangible assets decreases the agency costs (Chen, 2003). Moreover, Williamson (1988) argues that tangible assets have less asset specificity, which implies that increasing tangible assets' use as collateralization for debt can decrease lender's risk. Proponents agree this argument, such as Titman and Wessels (1988), Rajan and Zingales (1995), Ferri and Jones (1979), Qian *et al.* (2007), Gaud *et al.* (2005), Bradley *et al*., (1984) and Friend and Lang (1988). An analysis based on 1978-1980 data for a sample of 545 US companies also supports this positive relationship between real and financial behaviour. However, Ramlall (2009) implies that firms with low tangibility of assets seem to have high monitoring costs for shareholders, so higher level of debt plays a key role in monitoring. Booth *et al*. (2001), Bevan and Danbolt (2002) and Harris and Raviv (1990) agree with this negative relationship. Moreover, Stohs and Mauer (1996) and Chittenden et al. (1996) get a positive relation between long-term debt and tangibility, whereas a negative relationship between short-term debt and tangibility.

Friend and Lang (1988) proxy the value of tangible assets as

$$\text{Tangibility} = \text{book value of tangible assets} / \text{book value of total assets}$$

The alternative hypothesis for tangibility is

H_3: There is a significant positive relation between the leverage ratio and tangibility.

2.3.5 Profitability

Capital structure theories have contradicting views on the relationship between profitability and leverage. According to the static trade-off theory, profitable corporations would choose more debt to benefit from interest tax shields. Additionally, meeting less agency and bankruptcy costs also encourage profitable firms to issue more debt because of their strong ability to meet debt repayment obligations.

However, the pecking order theory suggests the opposite relationship, profitable firms have greater internal cash flow, and thus less need for debt (Fama and French, 2002), which imply the negative relationship between financial leverage and profitability. It is suggested that most empirical studies show these relationship. For instance, Titman and Wessels (1988) and Friend and Lang (1988) summarize that US corporations have the negative relationship and Kester *et al.* (1986) also find both US firms and Japanese firms have negative relationship between profitability and leverage ratio. Additionally, most recent research employing international data conforms this relationship, like Wald (1999) and Rajan and Zingales(1995) using data from developed nations, and Wiwattanakantang (1999) and Booth *et al.* (2001) using data from developing nations. However, Jensen (1986) suggests this negative relation exists only in an ineffective market for corporate control, since lenders have no incentive to lend as debt does not play an effective role in monitoring. Nevertheless, in case of an effective market for

corporate control, profitable firms may enjoy more debt financing, as the trade-off theory suggests. Moreover, though Long *et al.* (1985) find the relationship between leverage and profitability to be positive, the relationship is not statistically significant.

The agency cost model also has conflicting predictions on the relationship between profitability and leverage. The "control hypotheses" regards high debt as an incentive to ensure that managers pay out cash rather than building empires. Therefore, positive relationship is realized. Nevertheless, Chang and Chun (1999) demonstrate that the optimal contract between the investors and the managers can be treated as a combination of debt and equity.

Gill *et al.* (2011) argue that the interacting effect of capital structure and profitability should not be overlooked, because the capital structure decisions alter the returns of the companies and the capacity to interact with the competitive environment.

The profitability is represented by

The alternative hypothesis for profitability is

H_4: There is a significant positive relation between the leverage ratio and profitability.

2.3.6 Size

Firm size has been found to be a positive determinant of capital structure, both in trade-off

and agency cost theory (Agrawal and Nagarajan, 1990). Firm size is suggested to represent several variables such as lower transaction costs in issuing debt and lower information asymmetries. Furthermore, the agency theory recommended by Jensen (1986) and the transaction cost economics proposed by famous scholar Williamson (1988) maintain that more debt is used to control management behaviours resulting from dilute ownership. The bankruptcy costs are also connected with the firm size (Warner, 1977). Regarding the bankruptcy costs, the "scale economies" exist. These costs comprise a larger amount of the firm's value as firm's value decreases. Titman and Wessels (1988) agree this by proposing that large firms are more diversified and less vulnerable to bankruptcy than smaller ones. Consistent with this argument, Bevan and Danbolt (2002) suggest that large firms are regarded as 'too big to fail' and thus receiving better access to the capital market and borrow at much lower risk-adjusted interest rates than smaller companies (Akhtar and Oliver, 2005). Therefore, firm size is an inverse proxy of the probability of bankruptcy and there is a positive relationship between the size of the firm and the financial leverage ratio.

However, in the pecking order theory, size is also interpreted as a proxy for asymmetric information between outside investors and managers. Large companies may release more news because the investors are more concerned with gathering and analysing information about large companies (Kadapakkam *et al.*, 1998). This leads financial analysts to more closely observe large companies. Hence, large firms are less exposed to asymmetric information than small firms. As a result, they can issue more equity and less debt though they are more sensitive to information asymmetry (Rajan and Zingales, 1995). Therefore, this

suggests there is a negative relationship between the size of the firm and the firm capital structure.

The empirical evidence on the relationship between size and leverage provides ambiguous results. Rajan and Zingales (1995), Friend and Lang (1988), Michaelas *et al.* (1999), Marsh (1982) and Huang and Song (2002) find positive relation in the context of developed nations except Germany, whereas Titman and Wessels (1988), Kim and Sorensen (1986) and Kester (1986) propose negative relationship. To represent the size of a company, the natural logarithm of total assets is employed in this paper. According to Titman and Wessels (1988) and Rajan and Zingales(1995), the natural logarithm of sales is sometimes used as a proxy of the size.

The alternative hypothesis for firm size is

H_5: There is a significant positive relation between the leverage ratio and firm size.

2.3.7 Growth

Static trade-off theory predicts a negative relationship between the firm growth and leverage. It is worth noting that growth opportunities are the expected growth of intangible assets, the capital assets that cannot be collateralized such as competence, goodwill, research and development and managerial skills. The intangibility implies that firms lose much of their

value in the event of financial distress. Titman and Wessels (1988) and Rajan and Zingales (1995) put forward that this decreases the firm's capacity to raise debt and the firm will resort to the equity financing. In the context of UK market, Ozkan (2001) proposes that a firm with greater market-to-book value, another proxy for firm's growth opportunities, may have lower gearing ratio because the debt holder fear companies would refuse valuable investment opportunities. Rajan and Zingales (1995) agree this argument by adding that firms tend to issue stock when the stock price is higher relative to the book value. In addition, Bevan and Danbolt (2002) find no positive relationship between growth opportunity and financial leverage ratio after examining the determinants in the UK market. To summarize, the negative relationship between growth opportunity and leverage ratio is implied.

Moreover, it is suggested by agency cost theory that for growing firms the agency costs are higher as it is flexible to choose their future investment and the wealth of bondholders is expropriated (Titman and Wessels, 1988). Therefore, the bondholders will ask higher risk premium and the debt is more expensive. To summarize, the agency cost theory predicts a negative relationship between growth opportunity and the financial leverage ratio.

As predicted in the pecking order theory, firms with higher growth opportunities may face greater information disparities, which will increase its leverage levels to signal its high performance. Additionally, growing firms may not have sufficient internal funds to finance their investment opportunities, and greater preference on external financing through the preferred source of debt (Song, 2005). This is supported by the default probability theory of

Merton (1974) which also implies a positive relation between growth and leverage (Nishioka and Baba, 2004). Moreover, Myers (1984) argues that if the firm issues short-term debt rather than long-term debt, the relationship between financial leverage ratio and growth opportunity is also positive. This argument is supported by Michaelas *et al.* (1999), Ozkan (2000) and Titman and Wessels (1988).

Though the results are mixed, most empirical evidence shows the relation to be negative. In general, indicators of growth opportunities contain capital expenditures over total assets, research and development over sales and the growth of total assets calculated by the percentage change in total assets. This paper proxies the growth as

$$\text{Growth} = \text{average percentage change in the total assets}$$

The alternative hypothesis for growth is

H_6: There is a significant negative relation between the leverage ratio and company's growth.

2.3.8 Liquidity

Liquidity is treated as an indicator of company's capacity to fulfil short-term debt obligations. As the liquidity increases, the internal funds available to the firm and its ability to service previous debts will increase, which will attract more investors and shareholders, making it easier for the firm to raise more equity funds to meet future investment and decrease the need

for debt, which may be at the expense of bondholders. Additionally, as pecking order theory illustrates, firms with accumulated free cash flow and liquid assets will prefer the available internal capital over borrowing and issuing equity. This relation arises from the potential conflicts between shareholders and bondholders (Ozkan, 2001). Therefore, the liquidity of firm is predicted to be negatively related to the leverage. The empirical evidence supports this negative relation, like Deesomsak *et al.* (2004); Prowse (1990) and De Jong *et al*. (2008).

$$\text{Liquidity} = \text{current assets}/\ \text{current liabilities}$$

The alternative hypothesis for liquidity is

H_7: There is a significant negative relation between the leverage ratio and liquidity.

2.3.9 Free cash flow

Jensen (1986) defined the free cash flow as "cash flow in excess of that required funding all projects that have positive NPV when discounted at the weighted average cost of capital". As discussed in the agency cost theory, firms with excess free cash flow over required fund to finance all positive NPV projects may face moral hazard problem (a kind of agency problem) that may lead to overinvestment phenomena. Financial leverage tools play an effective role in addressing the free cash flow problem. The firm may go into bankruptcy if managers do not repay for debt holders. Therefore, debt acts as a disciplining tool to reduce the agency cost via reducing the free cash flow available for managers. This is regarded as the "control

hypothesis" (Jensen, 1986). There is a negative relationship between free cash flow and financial leverage ratio.

Lehn and Poulsen (1989) define the free cash flow as

Free cash flow = (EBIT + D & A - TAX - DIV - INT) / book value of total assets

Where:

EBIT = earnings before interest and tax

D & A = depreciation and amortization expense

TAX = income taxes paid

DIV = common dividends provided for or paid

INT = interest expense on debt

The alternative hypothesis for free cash flow is

H8: There is a significant negative relation between the leverage ratio and free cash flow.

2.3.10 Industry type

To analyse whether different industries have various effect on leverage ratio, the variable "Industry type" should also be examined. Proponents like Kester (1986), Long and Malitz (1985) and Bradley *et al.* (1984) argue the relationship between the industry classification and capital structure is significant. According to Harris and Raviv (1991), Pharmaceuticals, Instruments, Food and Electronics have low leverage whereas Paper, Textile mill products and Steel have high leverage. However, some opponents argue that the effect of industry type has

little effect on the financial leverage ratio. For instance, Fox and Balakcrishnan (1993) argue that specific industry characteristics play less important role than those firm-specific factors in affecting capital structure decisions.

Five industries, consisting of Industrials, Information Technology, Materials, Utility and Consumer Goods (consumer staples and consumer discretionary) are employed to analyse the effect of industry classification on capital structure. To avoid the problem of dummy trap, four dummy variables (Michaelas *et al.*, 1999; Frank and Goyal, 2003), D1, D2, D3 and D4 are introduced, where D1 signifies industrials industry, D2 signifies information technology industry, D3 signifies materials industry, and D4 signifies utility industry. Specifically, D1 equals 1 when the industry chosen is industrials industry, and D1 equals 0 for other industries. The coefficient of constant term signifies it is the consumer goods industry.

The alternative hypothesis for free cash flow is

H9: There is a significant relation between the leverage ratio and industry type.

The Table 1 summarizes the expected effect of the predicted determinants on financial leverage ratio, proposed by three capital structure theories (trade-off theory, agency cost theory and pecking order theory).

Table 1 The expected effect of the determinants on leverage ratio for the three capital structure theories.

Dependent variable	**Explanatory variable**	**Expected Effect**	**Trade-off theory**	**Agency cost theory**	**Pecking order theory**
Leverage ratio	Non-debt tax shields	-	-		
	Bankruptcy costs	-	-		
	Tangibility	+/-	+	+/-	+
	Profitability	+/-	+	+	-
	Size	+/-	+	+	-
	Growth	+/-	-	+/-	+

	Liquidity Free cash flow Industry type	- -		-	-

2.4 Empirical evidence on the determinants of capital structure

2.4.1 Empirical evidence from US and other developed countries

Titman and Wessels (1988) use data from US industrial corporations to analyse the effect of unobservable determinants on the corporate financial leverage ratios. The determinants considered include the uniqueness of business, proxied by the number of product lines and advertising expenditure, tangibility, firm size, profitability, non-debt tax shields, growth, volatility of earnings and industry type. The exogenous variables are based on three measures of debt ratio, including short-term, long-term and convertible debt. It is suggested that the uniqueness of business and profitability are negatively related to all the measures of financial leverage ratio. Additionally, firm size has negative relationship with short-term financial leverage ratios, which shows small US firms prefer short-term debt than long-term debt because the small firms may face high transaction costs with issuance of long term debt. Therefore, it is suggested that transaction costs may play a key role in US companies' capital structure, particularly for small firms. This study finds factors like non-debt tax shields, growth, volatility and tangibility in US industrial companies irrelevant.

Moreover, it is also worth noticing whether the factors in the US stated above are related to

the elements affecting capital structure in other developed nations. Rajan and Zingles (1995) find that the tangibility, firm size, high market to book ratio and profitability are negatively related to the financial leverage ratio. Unlike that in US firms, the firm size is investigated to have no effect on the financial leverage ratio. After testing the determinants of capital structure in UK non-financial companies, Bevan and Danbolt (2002) add that these determinants depend on the definition of gearing ratio chosen, such as non-equity liabilities to total assets, total debt to total assets and total debt to capital. Moreover, large firms employ long and short term debt more than small firms. Unlike the study of Rajan and Zingles (1995), the tangibility is positively related to both short and long-term debt. Bevan and Danbolt (2004) claim that the methodology employed to analyse also acts as a key player in the relationship between determinants and leverage ratio. For instance, whether it is pool data or panel data and whether the data controls for time and firm-specific heterogeneity contribute to the difference. In conclusion, the results are similar in the G-7 nations so that it can be concluded that the financial gearing ratio in other developed countries is determined by similar factors in US companies. This may be attributed to the legal and institutional similarities.

2.4.2 Empirical evidence from developing countries

According to Kunt and Maksimovic (1994) and Booth *et al.* (2001), though there are differences in the financial market development between the US and the sampled developing nations, the determinants that are significant are indicated similar. However, there are systematic differences in the way these financial leverage ratios are influenced by country factors such as growth, inflation rates, tax and development of capital markets.

Unlike proposed above, Delcoure (2007) finds the financial leverage ratio is positively related to the tangibility, non-debt tax shield and tax in the context of Central and Eastern European nations. The non-debt tax shields, managerial shareholdings and growth opportunity are negatively related to the financial leverage ratio (Huang and Song, 2005). Moreover, the trade-off theory, the agency cost theory and the pecking order theory explain only partially in their sampled countries. Booth *et al.* (2001) suggest that their findings are similar with Rajan and Zingales (1995) except for the market-to-book ratio and the tax. Booth *et al.* (2001) summarize the financial gearing ratio in developing nations are significantly lower than that of developed countries. This may imply that the agency costs of debt are considerably large in developing countries because the long term debt is not functioning effectively.

3. Statistical Analysis

This section will introduce the nature of the data, the leverage ratio in different industries, correlation matrix between different explanatory variables. Moreover, the regression model will be discussed. Its relevant model fit and explanatory variables will be evaluated critically. Finally, the drawback of the model analysis will be examined.

3.1 Data description

Panel data, the combination of time series and cross sectional, is used in this paper (Hsiao, 2003). There are several advantages for using panel data. First, panel data contains more observations so that the regression result is more precious. Second, unlike time series observation, panel data can avoid the aggregation bias, the problem of aggregating the potential heterogeneous individuals. Third, unlike the cross section observation, the panel data

can control for individual fixed effects. The panel data used for the statistical analysis is derived from balance sheet and income statement available in the database of the Datastream 5.1 over 15 years from 1998 to 2012. These data are used to smooth the leverage ratio and explanatory variables. The sample comprises 266 listed US companies in the Standard and Poor 500 Index, 56 from Industrials industry, 54 from Information Technology industry, 25 from Materials industry, 31 from Utility industry, and 100 from Consumer Goods industry, as Table 2 displays. It is worth noting that the analysis is conducted on secondary data. To avoid the survival bias, both financially sound corporations and companies in financial distress are included, because the profitability seems to play a key role in a firm's financing decisions. To ensure a balanced dataset in the sample, the rest 234 companies with missing variables in the Standard and Poor 500 Index are excluded. This can ensure only firms with continuous time series observations from 1998 to 2012 are selected and all information is available. Bradley *et al.* (1984), Wald (1999), Titman and Wessels (1988), and Rajan and Zingales (1995) also use data from developed nations, primarily from the US to examine the determinants of capital structure. It is also argued that the financial leverage ratios of public firms are significantly different from that of private firms, since the private firms rely more on debt financing (Brav, 2009). The choice of optimal financial leverage varies from nation to nation basis. The Table 3 describes the information of variables in the sample, including number of observations, the mean, the standard deviation, the minimum and the maximum values.

Table 2 Summary of different industries

Industry	Frequency	Percentage
Information technology	54	20.30%
Consumer goods	100	37.59%
Industrials	56	21.05%
Materials	25	9.40%
Utility	31	11.65%

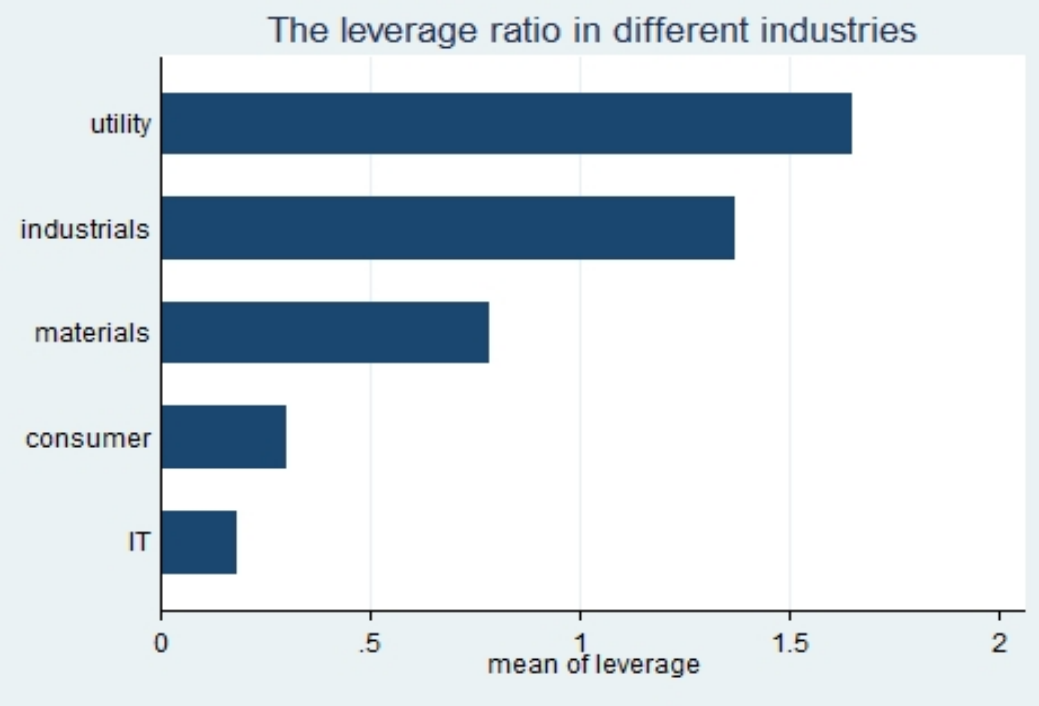
Table 3 Summary of the data in the statistical analysis

Variables	Number of observations	Mean	Standard deviation	Min	Max
leverage	3990	0.7027958	11.08782	-398.2443	347.0927
NDS	3990	0.0447678	0.0473674	0.0009963	1.806726
tangibility	3990	0.5969567	3.93505	0.001692	218.222
profitability	3990	1.084639	0.7731245	0	6.332831
size	3990	15.82634	1.33989	9.151863	20.49733

growth	3990	0.2127678	1.070863	-0.8480877	55.2643
liquidity	3990	1.90317	5.698222	0.2149058	353.495
fcf	3888	0.0864157	0.1280809	-4.95713	1.023957
z	3924	2.602703	3.926978	-25.98907	211.7289

The Figure 2 below displays the leverage ratio for each industry. The Utility Industry has the highest leverage ratio (debt over equity) on average with approximately 1.65. This indicates the Utility Industry issue more debt relative to equity than other industries. The Information Technology Industry has the lowest financial leverage ratio on average with about 0.25, which demonstrates that, compared with debt, it relies more on equity than other industries. It is important to examine the economic factors contributing to this dramatic difference. For Utility Industry companies, they are mostly controlled by the governments, and incumbent utility players have considerable barriers to entry. Specifically, setting up new plants needs extremely high fixed costs, and gaining regulatory approval can be complicated and long process for new entries. Additionally, there is a high switch cost for consumers to choose new plants. Most importantly, utility companies' products are necessities, and consumers do not have access to the substitute and their demand is inelastic. Therefore, utility industries have monopoly market, so they can set relatively higher prices to cover their debts and they can afford high debt/equity ratio. For other companies, the concentration ratio (a measure of the competitiveness of the market) is lower and their market is more competitive. There are substitutes for their products so they cannot have very high mark up. The Materials Industry has similar financial leverage ratio with the overall industries.

Figure 2 The leverage ratio in different industries



Then, to test the relationship between the firms' capital structure and its potential determinants, a random effects regression is conducted using the statistical package "STATA/IC 12.1". To test the hypotheses, the model is:

Where the exogenous variables, LEV is the financial leverage ratio of firm *i* in year *t.* The endogenous variables, NDS is the non-debt tax shields, TAN is the tangibility, PRO is the profitability, SZ is the size, GR is the growth, LQ is the liquidity, FCF is the free cash flow

and Z is the bankruptcy cost. IND_n signifies the industry type. Four dummy variables for industry type are added to avoid the dummy variable trap problem (to avoid the multicollinearity). The testable null hypothesis (H_0) under the model is that slope coefficients of endogenous variables are equal to zero, while the alternative hypothesis (H_n) is slope coefficient () is not equal to zero.

The results in Table 3 indicate that the mean value of financial leverage ratio, the debt over equity, is 0.7027958, which is equivalent to another proxy of the financial leverage ratio, the debt over debt plus equity, amounts to 0.41273. Rajan and Zingales (1995) maintain that U.S. firms have mean financial leverage ratio of approximately 0.38. Consistent with this, Adedeji (1998) states a mean gearing ratio of 0.38. The result of this study is similar to what is reported in other studies.

In the analysis, the presence of multicollinearity should be tested. The multicollinearity refers to the occurrence of two or more explanatory variables in a multiple regression model are highly correlated. This violates the OLS (Ordinary Least Square) assumption which makes the coefficients of the regression unstable and inefficient. The standard errors for the coefficients may be highly inflated, thus the estimation coefficients tend to be statistically insignificant even if they are important. Moreover, the existence of multicollinearity may also overstate the R^2 and F statistic, the coefficients tend to have the wrong sign and be more sensitive to small data changes. Therefore, the problem of multicollinearity makes the estimation and hypothesis testing about regression coefficients imprecise. Table 4 shows the correlations among all

endogenous variables except for the industry type. A high correlation between two of the explanatory variables may signal the existence of multicollinearity. However, there is no agreement about the level of the high correlation. Bryman and Cramer (2001) argue the correlation over 0.80 should be suspected of showing multicollinearity, whereas Anderson *et al.* (1999) state the correlation beyond 0.7 would signify the risk of multicollinearity. Kennedy (1998) shows that the correlation coefficient above 0.80 or 0.90 would claim the problem of multicollinearity. From the Table 4 below, the correlation coefficient between liquidity and bankruptcy cost is 0.88, which shows there is a high risk of multicollinearity. Furthermore, there is evidence that the firm with more growing opportunity have higher bankruptcy cost, higher non-debt tax shields, higher tangibility, lower profitability and smaller size. Moreover, the profitable firms tend to have more tangibility and non-debt tax shields. In terms of the firms with more free cash flow, they tend have more profits, tangibility, liquidity and growth opportunity, but those firms have smaller size and less non-debt tax shields.

Table 4 The correlation matrix between endogenous variables

Variables	**NDS**	**TAN**	**PRO**	**SZ**	**GR**	**LQ**	**Z**	**FCF**
NDS	1							
TAN	0.0492	1						
PRO	0.1827	0.0632	1					
SZ	-0.1116	-0.1269	-0.3036	1				
GR	0.0085	0.0007	-0.0555	-0.0096	1			
LQ	-0.0315	0.0033	-0.0263	-0.1241	0.0101	1		

Z	-0.0192	0.0226	0.2068	-0.2128	0.0823	0.8777	1	
FCF	-0.0120	0.0316	0.2319	-0.0890	0.0163	0.0032	0.2366	1

In addition to the multicollinearity, the problem of heteroskedasticity should also be taken into consideration. Heteroskedasticity also violates one of the OLS assumptions, which implies the errors in the regression model do not have a constant variance. The variance of error term is greater for some observations than for others. The heteroskedasticity makes the estimators inefficient, though it is still unbiased. To detect the presence of heteroskedasticity, the Breuch-Pagan test is used. As heteroskedasticity tests are sensitive to the assumption of normality, the normality is also tested using three tests, including Shapiro-Wilk normality test, Shapiro-Francia normality test and a test using skewness and kurtosis characteristics of a normal distribution. As the Appendix II displays, all these three tests assume the error terms are normally distributed (null hypotheses), p-value = 0 indicate the null hypotheses of all three tests should be rejected, and error terms are not normally distributed. Therefore, the estimates of coefficients maybe biased and the transformation of the variables, such as log transformation, is needed.

3.2 Results Analysis

As Table 5 illustrates, the estimated regression equation of the financial leverage ratio of the overall sampled companies over the period 1998-2012 can be summarized as follows:

Table 5 The regression results

Variables		
Non-debt shields	Coefficient	-1.101
	P value	0.055
Tangibility	Coefficient	-0.005
	P value	0.046
Profitability	Coefficient	-0.035
	P value	0.008
Size	Coefficient	0.057
	P value	0.149
Growth	Coefficient	0.029
	P value	0.000
Liquidity	Coefficient	0.008
	P value	0.081
Bankruptcy cost	Coefficient	-0.020
	P value	0.005
Free cash flow	Coefficient	0.549
	P value	1.620
Industrials	Coefficient	1.066
	P value	0.498
Information Technology	Coefficient	-0.110
	P value	0.550
Materials	Coefficient	0.467
	P value	0.678
Utility	Coefficient	1.275
	P value	0.656
Constant	Coefficient	-0.524

	P value	2.534

Table 6 below compares the empirical results with the theoretical prediction of determinants.

Table 6 Empirical results compared with the theoretical prediction

Explanatory variables	Theoretical prediction	Results of the analysis
Non-debt tax shields	**-**	-
Bankruptcy costs	**-**	-
Tangibility	**+/-**	-
Profitability	+/-	-
Size	**+/-**	+
Growth	**+/-**	+
Liquidity	**-**	+
Free cash flow	**-**	+
Industry type		

3.2.1 Model fit

Regarding the model fit, the most commonly used measure is the goodness of fit statistic, R^2, the square of the correlation between the values of the exogenous variable and the corresponding fitted values from the model. It implies how much the variation of the exogenous variables is explained by endogenous variables. High R^2 indicates the model fits the data well. As Appendix I shows, R^2 in this model is 0.2278, which represents about only 22.78% of the variations in the financial leverage ratio can be explained by the variations in the determinants of the above regression model.

3.2.2 Non-debt tax shields

As can be seen, the variable, non-debt tax shields is negatively related to the financial leverage ratio, which conforms to the prediction in the trade-off theory and supports the argument that the non-debt tax shields decreases the fiscal benefit of debt and thus decreasing the need to issue debt for tax consideration. However, the p-value is so large that the coefficients are statistically insignificant and there is not enough evidence to reject H_1. Michaelas *et al*. (1999) and Titman and Wessels (1988) also indicate an insignificant coefficient. It is recommended that though a firm with high tax expense can benefit from debt issuance due to interest tax shields, a firm with high tax requirement is generally relatively profitable and employs less debt financing proposed by the pecking order theory. Additionally, proponents like Desai *et al.* (2004) find no effect between tax shields and the financial leverage ratio. Therefore, it is difficult to summarize whether a firm's tax status plays a predictable and material role in its capital structure decisions (Myers, 1984; Michaelas *et al*., 1999). Furthermore, the measurement problem makes it hard to estimate the sensitivity of capital structure to tax shields incentives. Similar result is supported by Ozkan (2000), Banerjee *et al.* (2000) and Flannery and Rangan (2006).

3.2.3 Bankruptcy cost

Consistent with the prediction of the trade-off theory, bankruptcy cost has negative relationship with the financial leverage ratio. 1 unit increase in the bankruptcy cost will lead to 0.2 unit decrease in the leverage ratio of the US sample firms. The coefficient of bankruptcy cost is statistically significant and H_2 is accepted. It can be concluded that the

bankruptcy costs of the sample firms conforms to the Altman model.

3.2.4 Tangibility

According to the result, the tangibility of sampled data is negatively correlated to the gearing ratio and statistically significant, which is consistent with the previous argument. I unit increase in the tangibility will decrease the financial leverage ratio by 0.005 unit. The tangibility is confirmed to be a key determinant of US listed firms' financial leverage, and firm with more tangible assets tend to have less financial leverage ratio. As stated above, firms with low tangibility of assets seem to have high monitoring costs for shareholders, so higher level of debt play a key role in monitoring (Ramlall, 2009). This negative relation is also verified by Bevan and Danbolt (2002) and Booth *et al.* (2001). The proposed hypothesis H_3 is rejected.

3.2.5 Profitability

Profitability is negatively related to the financial leverage ratio, which is in line with the pecking-order theory. The coefficient of profitability is significant at the 5% significance level and H_4 is rejected. The profitability seems to be an important factor affecting US listed firms' capital structure decisions. 1 unit increase in the profitability may generate 0.8 decrease in companies' financial leverage ratio. This indicates the sample US firms prefer internal funds to external funds. As stated above, most recent research employing international data conforms this relationship, like Wald (1999) and Rajan and Zingales (1995) using data from developed nations, and Wiwattanakantang (1999) and Booth *et al.* (2001) using data from

developing nations. Since US financial market is generally ineffective and lenders have less incentive to lend as debt does not play an effective role in monitoring, this conforms with Jensen *et al*. (1986)'s argument that negative relation exists only in an ineffective market for corporate control.

3.2.6 Size

The regression results show that the determinant size is positively related to the financial leverage ratio, which conforms to the prediction in trade-off theory and agency cost theory. However, the coefficient of the size is not significant due to the relatively high p value. Therefore, there is not enough evidence to reject H_5. It can be summarized that the size seems not to be a determinant of US listed firms' capital structure decisions, which is consistent with Remmers *et al.* (1974). Cassar and Holmes (2003) also claim a positive but insignificant relationship for financial leverage ratio.

3.2.7 Growth

As stated above, the effect of growth opportunity on financial leverage ratio can be questionable. The result shows very significantly positive correlation between the growth opportunity and financial leverage ratio and the proposed hypothesis H_6 is rejected. 1 unit increase in growth opportunity will contribute to 2.9 unit increase in the firms' financial leverage ratio. This corresponds with the prediction in the pecking order theory that firms with higher growth opportunities may face greater information disparities, increasing its leverage levels to signal its high performance. Additionally, growing firms may not have

sufficient internal funds to finance their investment opportunities, and greater preference on external financing through the preferred source of debt (Song, 2005).

3.2.8 Liquidity

Inconsistent with what has been stated in the majority of the literature, the factor of liquidity is proven to be positively related to the financial leverage ratio. This contradicts with the prediction stated above. The coefficient of liquidity is not significant, which means the liquidity has no effect on the financial gearing ratio in the US companies with this sample data and there is not enough evidence to reject H_7.

3.2.9 Free cash flow

Unlike predicted above, the regression results indicate that free cash flow is positively related to the financial leverage ratio. However, the coefficient of free cash flow is not statistically significant and there is not sufficient evidence to reject the hypothesis H_8. Therefore, the factor free cash flow does not a vital role in the financial leverage ratio of the sampled US firms.

3.2.10 Industry type

Table 5 shows the regression coefficients and p-values for each industry dummy variable, and all four industries except consumer goods industry are included in the regression model to

avoid the dummy variable trap. The coefficient of constant term represents the intercept of consumer goods industry, meaning how much the financial gearing ratio of the consumer goods industry differs from that of other four industries respectively. For example, the financial leverage ratio of consumer goods industry is 31.4% higher than that of information technology industry.

Regarding the industry type, the positive sign of D1, D3 and D4 show the leverage ratio of industrials industry is higher than that of other industries. The similar results can be found in materials industry and utility industry. All of incumbents in these three industries have considerable barriers to entry. Setting up new plants needs extremely high fixed costs can be complicated and long process for new entries. The negative sign of information technology demonstrates that the financial gearing ratio of information technology industry is lower than that of other industries. This is attributable to information technology's own characteristics. Since most of assets are intangible, such as specific patents and R&D activities, companies in information technology industry will face a greater loss in value in case of bankruptcy. Porter's strategic framework can be applied which imply investments in highly specific assets (such as innovation or product differentiation) are associated with lower financial leverage. Moreover, information technology companies have high business risk issue and would be less certain of generating enough income to utilize their debt tax shields. However, the p value of the coefficient of all industry variables is so high that these coefficients are not significant and H_9 is rejected.

To summarize, the tangibility, profitability, growth and bankruptcy cost are significant

determinants of US listed companies. Tangibility, profitability and bankruptcy cost are negatively related to the financial leverage ratio, whereas growth is negatively related to the financial leverage ratio. There is not enough evidence to prove that the non-debt shields, size, liquidity, free cash flow and industry type affect US firms' financial gearing ratio significantly. The summary of the results of the proposed hypotheses is displayed below.

Table 7 Results of the proposed hypotheses

Hypotheses	**Accepted/Rejected**
H1: There is a significant negative relation between the leverage ratio and non-debt tax shields.	H_1 is accepted.
H2: There is a significant negative relation between the leverage ratio and bankruptcy costs.	H_2 is accepted.
H_3: There is a significant positive relation between the leverage ratio and tangibility.	H_3 is rejected.
H_4: There is a significant positive relation between the leverage ratio and profitability.	H_4 is rejected.
H_5: There is a significant positive relation between the leverage ratio and firm size.	H_5 is accepted
H_6: There is a significant negative relation between the leverage ratio and company's growth.	H_6 is rejected.

H_7: There is a significant negative relation between the leverage ratio and liquidity.	H_7 is accepted.
H_8: There is a significant negative relation between the leverage ratio and free cash flow.	H_8 is accepted.
H_9: There is a significant relation between the leverage ratio and industry type.	H_9 is rejected.

3.3 Drawback

3.3.1 Data selection

The book value of equity is adopted in this paper due to the data availability. However, since the information expressed in book value and market value are informative in different aspects, whether lacking market data in the analysis of determinants of capital structure may lead to conflicting results is questionable (Loof, 2004). Beaver and Ryan (2000) suggest that market value and book value are different. Ross *et al.* (2008) agree this by arguing that book value and market value should be distinguished. Bowman (1980) puts forward that the cross-sectional correlation between the book value and market value of debt is extremely small. Moreover, Auerbach (1985) argues that when market values are used rather than corrected book values, the explanatory power of the regression model is substantially increased. However, Brealey and Myers (2003) criticize that the market value includes the value of intangible assets produced by advertising, research and development and personnel education, whose value cannot be sold easily. Furthermore, the value of intangible assets may

even disappear when bankruptcy. Graham and Harvey (2001) argue that the use of book values is reasonable because financial managers mainly use book values in their decision making. Therefore, the misspecification arising from adopting book value measures is relatively small, and it should not matter much if only the book value of equity is used. Moreover, the data set used is extracted from the firms' annual reports in Datastream. It is suggested that the reliability and accuracy of data may influence the robustness of the results.

Secondly, in terms of the firm selection, Standard & Poor's 500 companies involved in this paper are large and strong, because S&P 500 is based on the market capitalization and these firms survive the 2008 financial crisis. These may not represent all US companies and exclusion of failed firms may create the survivorship bias. Failed firms are implied to have lower earning, profitability and growth which would have had larger financial leverage ratio.

3.3.2 Determinants and proxies of determinants

The regression model above has relatively low R^2 which signifies low explanatory power and the variance in the dependent variable is not explained by explanatory variables well. This may arise from ignoring several predicted determinants of capital structure, such as business risk, agency cost and credit rating.

Business risk is associated with the volatility of the firm's operating income. When the business risk increases, the firm's ability to service debts may decrease and its possibility to acquire new debts from financial institutions and banks may also decrease. Therefore, it seems that the firm would turn to the cheaper source of capital, the equity. There is a

significant negative relationship between business risk and the leverage ratio (Akhtar and Oliver, 2005).

The agency cost is another important independent variable that is not taken into consideration. In the trade-off theory, there is a negative relationship between agency costs and leverage ratio, while in the agency cost theory, there is a positive relationship between agency costs and leverage ratio. Myers (1977) suggests that agency problems are serious in firms that have assets providing greater growth opportunities in the future, so the more the investment in such assets, the less reliance on the debt. Moreover, Burgman (1996) suggests that the multinational companies usually have higher agency cost than that of domestic companies. Myers (1984) uses the expenses on research and development as the proxy for agency costs.

Another key variable is the investment. A higher investment may lead to higher financial leverage. Therefore, it is anticipated that investment is positively related to the leverage ratio.

It is also worth noting the effect of credit ratings on each firm's financial leverage ratio. Credit rating is associated with a credit agency's opinion on the general creditworthiness of an obligor. It is commonly accepted as a measure for credit quality. It is suggested that the credit agencies' rating on debt play a key role in the capital structure. However, this study does not have full access to the credit rating agencies, like the Standard and Poor's and Moody's for all 266 sample firms. Firms with high credit ratings may benefit from low cost of debt and issue more debt. Therefore, more work on the relationship between credit rating and financial

leverage ratio is needed.

Moreover, different proxies for different variables used in this paper may not perfectly represent the theoretical determinants, though these proxy variables have been advocated empirically and theoretically. Furthermore, it is difficult to find the proxies that are not related to another. It seems that the issue of picking appropriate proxy variable is a common problem to the empirical analysis of capital structure.

Lastly, this paper does not investigate the effect of general macroeconomic factors on the capital structure dynamics of firms. For instance, the financial crisis in 2008 in the United States had an adverse effect on the financial markets, which reduces the security issuance by companies and the ability of lending by financial institutions. According to Fosber (2012), during year 2006 and 2008, financial crisis and its simultaneous recession significantly increase the leverage ratio (market debt ratios) by approximately 5.5% of sample firms. After isolating the consequences of the recession on firm capital structure, it is estimated that nearly all (5.1%) of the debt accumulation was attributed to the financial crisis. However, by the end of 2010, it is realized that the financial crisis's effect on companies' financial leverage is virtually reversed. Therefore, the effect of financial crisis may play a key effect on the trend of financial gearing ratio.

As stated above, the error terms in the sample data are not normally distributed. The estimates of coefficients maybe biased and the transformation of the variables, such as log

transformation, is needed.

4. Conclusion

To summarize, there are varied determinants of capital structure in US firms. An optimal capital structure is essential for companies raising a given amount of funds, since it minimizes the firm's composite cost of capital and maximizes the whole firm's common stock price. Capital costs can reduce the size of the cash dividend that could be paid to common stockholders and the size of interest associated with principles paid to debt holders. Companies with costs being reduced would face greater competitive pressure in product markets and would have a greater incentive and hence a greater tendency to do so. It is worth noting the characteristics and determinants of firms' capital structure. There are mainly three theories on capital structure, which put relatively different emphasis on the determinants that could influence the choice between debt and equity, like asymmetric information, agency costs, taxes, bankruptcy costs and the effects of market imperfections or regulatory constraints. It is argued that no capital structure theory is superior to another. It ranges from irrelevance theory of capital structure, proposed by Modigliani and Miller (1958), to several relevant theories on capital structure. The irrelevance theory by Modigliani and Miller propose that the firm's value is dependent on the profitability of firms' assets and not on how the firms' assets are financed by equity or debt. The static trade-off theory is that if financial leverage can increase a firm value in Modigliani and Miller's tax model, firms have to trade-off between the financial distress costs and interest tax shields. The pecking order theory proposes that changes in leverage ratios are driven by the internal financial deficit, and financing policies tend to follow a certain hierarchy of preferences: internal financing, debt financing and equity

financing. The agency cost theory suggests that agency costs conflicts exist between shareholders and bondholders and between the manager and shareholder. The debt can be used as a disciplining tool to mitigate the agency costs and the over investment, this is regarded as the control hypothesis. The determinants that are proved to be significant in developing countries are suggested to be similar with that of the developed nations.

Based on previous theoretical and empirical evidence, this paper employs data of 266 US listed companies from Standard and Poor's 500 during the year 1998 to 2012. It proposes 9 hypotheses concerning the relationship between nine determinants and financial leverage ratio. Nine potential determinants of US listed companies' capital structure examined are non-debt shields, bankruptcy costs, tangibility, profitability, growth, size, liquidity, free cash flow, and industry type. The average value of financial leverage ratio (debt over debt plus equity) is 0.41273, which is similar to what is reported in other studies. After testing the problem of multicollinearity and heteroskedasticity, the regression results show the tangibility, profitability, growth and bankruptcy costs are statistically significant, so they are regarded as important determinants for US listed firms' financial leverage. However, not all explanatory variables are significant. There is not enough evidence to demonstrate that the determinants, non-debt shields, size, liquidity, free cash flow and industry type play a key role in the firms' capital structure decisions with 5% significance level. The evidence from the empirical findings have indicated the theories of capital structure explain the US listed firms' gearing ratio to certain extent. However, the empirical results demonstrate a relative disparity between the empirical result and theoretical prediction on some variables. The model fit illustrates that

the 22.78% of the variations in the financial leverage ratio is explained by the variations in the determinants of the above regression model.

In terms of the drawbacks of the study, the low model fit shows low explanatory power and the variance in the dependent variable is not explained by explanatory variables well. This may arise from ignoring several predicted determinants of capital structure, such as business risk, agency cost and credit rating. The effect of the general macroeconomic factors (like 2008 financial crisis) on the US firms' capital structure dynamics is not taken into consideration. Moreover, whether the usage of book value of equity rather than the market value of equity would produce biased results is evaluated. Sampled companies exclude failed firms in the 2008 financial crisis which may create the survivorship bias. More rigorous empirical tests are required.

References

Adedeji, A. (1998) Does the Pecking Order Hypothesis Explain the Dividend Payout Ratios of Firms in the UK. *Journal of Business Finance and Accounting,* 25, 1127-157.

Agrawal, A. and Nagarajan, N.J. (1990) Corporate capital structure, agency costs and ownership control: The case of all-equity firms, *Journal of Finance*. 45(4), 1325-31.

Akhtar, S. and Oliver, B. (2005) *The determinants of capital structure for Japanese multinational and domestic corporations.* [online] Available from < http://ecocomm.anu.edu.au/research/papers/pdf/FINM0040WP.pdf>[29 July 2013]

Allen, D. (1993) The Pecking Order Hypothesis: Australian Evidence. *Applied Financial Economics,* 3, 101-120.

Altman, E. (2000) *Predicting Financial Distress of Companies: Revisiting the Z score and Zeta Models.* [online] Available from http://pages.stern.nyu.edu/~ealtman/PredFnclDistr.pdf > [25 July 2013]

Anderson, D., Sweeney, D. and William, T. (1999) *Statistics for Business and Economics*. St.Paul (MN): West Publishing Company.

Angelo, H., and Masulis, R. (1980) Optimal Capital Structure under Corporate and Personal Taxation. *Journal of Financial Economics*, vol. 8, 1980, pp. 3–29.

Asquith, R., and Mullins, D. (1986) 'Equity issues and offering dilution', *Journal of Financial Economics* 15: 61-89.

Auerbach, A.J. (1985) Real Determinants of Corporate Leverage, *University of Chicago Pres*s, Chicago, IL, NBER No. 616, pp.301-22.

Auerbach, A. J. (2002) Taxation and Corporate Financial Policy, in Alan J. Auerbach, and Martin Feldstein, eds.: *Handbook of Public Economics Volume III* (North-Holland, New York).

Banerjee, S., Heshmati, A. and Wihlborg, C. (2000) The Dynamics of Capital Structure. *Stockholm School of Economics Working Paper Series in Economics and Finance* No. 333.

Baskin, J. (1989). An Empirical Investigation of the Pecking Order Theory. *Financial Management*, 18, 26-35.

Bauer, P. (2004) Determinants of capital structure, empirical evidence from the Czech Republic. *Czech Journal of economics and finance*, 54, 2004. 1-2.

Beaver, W. H. and Ryan, S.G. (2000) "Biases and lags in book value and their effects on the ability of the book-t-market ratio to predict book return on equity", Vol. 38. 127-148.

Bevan, A. and Danbolt, J. (2002) Capital Structure and Its Determinants in the UK – A Decomposition Analysis. *Applied Financial Economics,* 12(3), 159-170.

Booth, L., Aivazian, V., Demirguckunt, A., and Maksimovic, V. (2001) Capital Structure in Developing Countries. *Journal of Finance*, vol. 56, 2001, pp. 87–130.

Bowman, J. (1980) The Importance of a Market Value Measurement of Debt in Assessing Leverage. *Journal of Accounting Research*, 18, 242-54.

Bradley, M., Jarrell, G. and Kim, E. H. (1984) On the Existence of an Optimal Capital Structure: Theory and Evidence. *Journal of Finance*, vol. 39, 1984, pp. 857–878.

Brav, O. (2009) Access to capital, capital structure, and the funding of the firm. *The Journal of Finance*. Vol. 64. pp. 263-308.

Brealey, R.A. and Myers, S.C., (2003) *Principles of Corporate Finance*, 7th ed., McGraw Hill.

Brealey, R. A., Myers, S. C. and Allen, F. (2008) *Principles of Corporate Finance*, 9th ed, McGraw Hill.

Brennan, M. and Kraus, A. (1987) Efficient financing under information asymmetry, *Journal of Finance* 42, 1225-1243.

Bryman, A. & Cramer, D. (2001) *Quantitative Data Analysis with SPSS Release 10 for Windows*, London: Routledge.

Burgman, T.A. (1996) An empirical examination of multinational corporate capital structure, *Journal of International Business Studies* 27(3), 553-57.

Calomiris, C., Himmelberg, C. and Wachtel. P. (1995) Commercial Paper and Corporate Finance: A Microeconomic Perspective. *Carnegie Rochester Conference Series on Public Policy*. 45:203–50.

Cassar, G. and Holmes, S. (2003) 'Capital Structure and Financing of SMEs: Australian Evidence', *Accounting and Finance.* 43, pp. 123-147.

Chang and Chun (1999) Capital structure as optimal contracts, North American. *Journal of Economics and Finance* 10(2), 363-85.

Chaplinsky, S. and Niehaus, G. (1993) Do Inside Ownership and Leverage Share Common Determinants? *Quarterly Journal of Business and Economics*, vol. 32, 1993, pp. 51–65.

Chen, J. J. (2003) "Determinants of Capital Structure of Chinese-listed Companies", *Journal of Business Research*, Vol.57, pp 1341-1351.

Chirinko, Robert, and Singha, A. (2000) Testing static trade-off against pecking order models of capital structure: A critical comment, *Journal of Financial Economics.* 58, 417-425.

Chittenden, F., Hall and Hutchinson, G.P. (1996) "Small Firm Growth, Access to Capital Markets and Financial Structure: Review of Issues and an Empirical Investigation", *Small Business Economics*, 8, 59-67.

Constantinides, G. M., Harris, M. and Stulz, R. M. (1989) Optimal investment with stock repurchase and financing as signals, *Review of Financial Studies* 2, 445-465.

Constantinides, G. M., Harris, M. and Stulz, R. M. (2008) *Handbook of the economics of finance.* Oxford: North-Holland.

Copeland, T. E., Weston, J. F., and Shastri, K. (2005) *Financial Theory and Corporate Policy* 4th ed, Addison Wesley.

Cornelli, F. and Felli, L. (1995) "The Theory of Bankruptcy and Mechanism Design", in*Crisis, What Crisis? Orderly Workouts for Sovereign Debtors*, London: CEPR.

D'Mello, R. and Ferris, S.P. (2000) The information effects of analyst activity at the announcement of new equity issues, *Financial Management* 29: 78-95.

De Jong, A.D., Kabir, R., and Nguyen, T.T. (2008). Capital structure around the world: The roles of firm- and country-specific determinants. *Journal of Banking and Finance.* 32(9), 1954-1969.

DeAngelo, H. and R. W. Mausulis. (1980) "Optimal capital structure under corporate and personal taxation, Journal *of Financial Economics",* pp- 3-29.

Deesomsak, R., Paudyal, K., and Pescetto, G., (2004). The determinants of capital structure:

Evidence from the Asia Pacific region. *Journal of Multinational Financial Management.* 14(4-5), 387-405.

Delcoure, N. (2007) The determinants of capital structure in transitional economies. *Journal of International Review of Economics and Finance,* 16, 400-415.

Desai, M. A., Dyck, A., and L. Zingales. (2004) Theft and taxes. *Journal of Financial Economics* 84: 591-623.

Dierkens, N. (1991) Information asymmetry and equity issues. *Journal of financial and quantitative analysis* 26: 181-199.

Doukas, J.A. and Pantzalis, C. (2003) 'Geographic diversification and agency costs of debt of multinational firms', *Journal of Corporate Finance* 9, 59-92.

Eckbo, B. (2008) *Handbook of corporate finance, empirical corporate finance*. Volume 2

Fama, E. and French, K. (2002) Testing Trade-off and Pecking Order Predictions About

Dividends and Debt, *Review of Financial Studies*, 15, pp. 1-33.

Fazzari, S., Hubbard, R. G. and B. Petersen. (1988) Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity* 1:141–95.

Ferri. M. G. and Jones.W. H. (1979) "Determinants of financial structure: a new methodological approach", *Journal of Finance*, Vol.34, pp 631-644.

Flannery, M. and K. Rangan. (2006) Partial adjustment toward target capital structures.

Journal of Financial Economics 79, 469-506.

Fosber, R. H. (2012) Capital structure and the financial crisis. *Journal of Finance and Accountancy.*

Fox, I. and Balakrishnan, S. (1993) Asset specificity, firm heterogeneity and capital structure. *Strategic Management Journal*, 14: 3–16.

Frank, M. Z. and Goyal, V. K. (2003) Testing the Pecking Order Theory of Capital Structure", *Journal of Financial Economics*, V67, pp. 217-248.

Friedman, B. M. (1982) *The Changing Roles of Debt and Equity in Financing U.S. Capital Formation.* Chicago: University of Chicago Press.

Friend, I. and Lang, L. (1988): An Empirical Test of the Impact of Managerial Self-interest on Corporate Capital Structure. *Journal of Finance*, vol. 43, 1988, pp. 271–281.

Gardner, J. and Trzcinka, C. (1992) All-equity firms and the balancing theory of capital structure. *Journal of Financial Research,* 15, 77-90.

Gaud, P., Jani, E., Hoesli, M., and Bender, A. (2005) The capital structure of Swiss firms: An empirical analysis using dynamic panel data. *Journal of European Financial Management*, 11, pp. 51–69.

Gill, A. & Mathur, N. (2011) The effects of capital structure on profitability: evidence from United States. *International Journal of Management*, Vol.28, pp.3-15.

Gillan, S. L. and Starks, L.T. (2007) The evolution of shareholder activism, *Journal of Applied Corporate Finance.* 19, 55-73.

Graham, J. R. (2000) How Big Are the Tax Benefits of Debt? *Journal of Finance* 55, 1901-1942.

Graham, J.R. and Harvey, C.R. (2001) The theory and practice of Corporate Finance: Evidence from field, *Journal of Finance Economics*, 60, pp. 187-243.

Graham, J. R. (2003) Taxes and corporate finance: A review", *Review of Financial Studies* 16, 1074–1128.

Graham, J.R., Lag, M. H., and Shackeford, D.A. (2004). Employee Stock Options, Corporate Taxes, and Debt Policy. *Journal of Finance,* 59, 1586-1615.

Haan, L. and Hinloopen, J. (2003) Ordering the preference hierarchies for internal finance, bank loans, bond, and share issues: Evidence from Dutch firms. *Journal of Empirical Finance*, 10(5), pp. 661–681.

Harris, M. and Raviv, A. (1990) Capital Structure and the Informational Role of Debt. *Journal of Finance,* 45, 321-349.

Harris, M. and Raviv, A. (1991) The Theory of Capital Structure. *Journal of Finance*, vol. 46, 1991, pp. 297–355.

Heinkel R. and Zechner, H. (1990) The role of debt and preferred stock as a solution to adverse investment incentives. *Journal of financial and Quantitative Analysis* 25, 1-24.

Helwege, J. and Liang, N. (1996) Is there a pecking order? Evidence form a panel of IPO firms, *Journal of Financial Economics*, 40, pp. 429–458.

Hirshleifer, J. (1966) Investment decision under uncertainty: Applications of the state preference approach, *Quarterly Journal of Economics* 80, 252-277.

Hsiao, C. (2003) *Analysis of Panel Data*, 2ndEdition. UK: Cambridge University Press.

Huang, S. G. and Song, F. M. (2002) The Determinants of Capital Structure: Evidence from China. *Hong Kong Institute of Economics and Business Strategy, Working Paper,* 2002, no. 1042.

Huang, S. G. and Song, F. M. (2005). The Determinants of Capital Structure: Evidence from China. *China Economic Review*, 1-23.

Jensen, M.C. (1986) "Agency Costs of Free Cash Flow, Corporate Finance and Takeovers", *American Economic Review*, Vol. 76, pp. 323-329.

Jensen, M. and Meckling, W. (1976) The theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure. *Journal of Financial Economics*, 3(4), 305-360.

Kapadakkam, P. R., Kumar, P. C., and Riddick, L.A. (1998) The impact of cash flows and firm size on investment: The international evidence. *Journal of Banking and Finance*, 22, 293-320.

Kennedy, P. (1998) *A Guide to Econometrics*. 4th ed. Oxford: Blackwell.

Kester, C. W. (1986) Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Corporations. *Financial Management*, vol. 15, 1986, pp. 5–16.

Kim, W. S. and Sorensen, E. H. (1986) Evidence on the Impact of the Agency Costs of Debt on Corporate Debt Policy. *Journal of Financial and Quantitative Analysis*, 21, (1986), 131-144.

Krasker, W. S. (1986) Stock price movements in response to stock issues under asymmetric information, *Journal of Finance* 41, 93-105.
Kraus, A. and Litzenberger, R.H. (1973) A State-Preference Model of Optimal Financial Leverage, *Journal of Finance* 33, 911-922.

Kunt, A. and Maksimovice, V. (1994). Capital Structure In Developing Countries: Evidence From Ten Countries. *Working Paper*, The World Bank, Policy Research Paper, No. 1320.

Lasfer, M.A. (1995) Agency Costs, Taxes and Debt: The UK Evidence' *European Financial Management,* 1(3), 265-285.

Lehn, K. and Poulsen, A. (1989) Free cash flow and stockholder gains in going private transactions, *Journal of Finance* 3, 771-87.

Long, M. and Maltiz, I. (1985) The investment-financing nexus: Some empirical evidence, *Midland Corporate Finance Journal* 3, 53-59.

Lööf, H. (2004) Dynamic optimal capital structure and technical change, *Structural Change and Economic Dynamics,* 15(4), pp 449-468.

Maksimovic, V. and Phillips, G. (1998) Asset Efficiency and Reallocation Decisions of Bankrupt Firms, *Journal of Finance* 53, 1495-1532.

Marsh, P. (1982) The choice between equity and debt an empirical study, *Journal of Finance*, Vol.37, pp. 121-144.

Megginson, W. L., Smart, S. B. and Gitman, L. J. (2007) *Corporate Finance*. New York: South Western.

Merton, R.C. (1974) On the pricing of corporate debt: The risk structure of interest rates,

Journal of Finance 29 (1974), 449-470.

Michaelas.N., Chittenden, F. and Poutziouris, P. (1999) Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data, *Small Business Economics*, Vol.12, pp 113-130.

Mittoo, U. and Zhang, Z. (2005) 'The capital structure of multinational corporations: Canadian evidence', *Working paper*, I.H. Asper School of Business, University of Manitoba.

Modigliani, F. and Miller, M. H. (1958) The Cost of Capital, Corporate Finance and the Theory of Investment. *American Economic Review*, 48, 261-97.

Myers, S. (1977) Determinants of corporate borrowing. *Journal of financial economics,* Vol. 5, pp.147-175.

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

Myers, S. C. (2001) 'Determinants of corporate borrowings', *Journal of Financial Economics* 13, 187-221.

Myers, S. and Majluf, N. (1984) Corporate Finance and Investment Decisions When Firms Have Information That Investors Do not Have. *Journal of Financial Economics* 13, 187-221.

Nishioka, S. and Baba, N. (2004) Dynamic capital structure of Japanese firms: How far has reduction of excess leverage progressed in Japan', *Bank of Japan working paper series,*04-E-16.

Noe, T. (1988) Capital Structure and signaling game equilibria, *Review of Financial Studies.* 1, 331-356.

Ozkan. A. (2000) An empirical analysis of corporate debt maturity structure, *European Financial Management*, Vol.6, pp. 197-212.

Ozkan, A. (2001) Determinants of capital structure and adjustments to long run target: Evidence from UK company panel data, *Journal of Business Finance and Accounting*, Vol.28, pp. 175-195.

Prowse, S. D. (1990) Institutional investment pattern and corporate financial behaviour in the United State and Japan. *Journal of Financial Economics*. 27(1), 43-66.

Qian, Y., Tian, Y., and Wirjianto, T. S. (2007) A*n Empirical Investigation into the Capital-Structure Determinants of Publicly Listed Chinese Companies: A Dynamic Analysis, Research for Private Economy and School of Economics at Zhejiang University*, Institute of Quantitative Finance and Insurance at University of Waterloo, Ontario, Canada.

Rajan, R. G. and Zingales, L. (1995) What Do We Know about Capital Structure? Some Evidence from International Data. *Journal of Finance*, vol. 50, 1995, pp. 1421–1460.

Ramlall, I. (2009) Determinants of Capital Structure among Non-Quoted Mauritian Firms under Specificity of Leverage: Looking for a Modified Pecking Order Theory.

Remmers, L., Stonehill, A., Wright, R. and Beekhuisen, T. (1974) Industry and Size as Debt Ratio Determinants in Manufacturing Internationally, *Financial Management* (Summer), pp. 24- 32.

Ross, S. (1977) The Determination of Financial Structure: the Incentive-Signalling Approach. *Bell Journal of Economics,* 8(1), 23-40.

Ross, S. A., Westerfield, R. W. and Jordan, B. D. (2008) Corporate Finance Fundamentals 8th

ed. New York: McGraw Hill.

Shah, A. and Khan, S. (2007) Determinants of Capital Structure: Evidence from Pakistani PanelData, I*nternational Review of Business Research Papers*, vol. 3, No. 4, pp. 265-282.

Shenory, C. and Koch, P. (1992) The Firm's Leverage-Cash Flow Relationship, *Journal of Empirical Finance* 2, 307-331.

Shyam-Sunder, L. and Myers, S. C. (1998) Testing static trade-off against pecking order models of capital structure. [online] Available from <http://pages.stern.nyu.edu/~eofek/PhD/papers/SM_Testing_JFE.pdf>[25 July 2013]

Song, H. S. (2005) Capital structure determinants, an empirical study of Swedish companies. [online] Available from <http://www.infra.kth.se/cesis/documents/WP25.pdf>[2 August 2013]

Stiglitz, J. E. (1969) A Re-Examination of the Modigliani-Miller Theorem. *American Economic Review*, American Economic Association, Vol. 59(5), pages 784-93, December.

Stohs, M. H. and Mauer, D. C. (1996) "The Determinants of Corporate Debt Maturity Structure", *Journal of Business*, 69, 3, 279-312.

Targgart, R. A. (1977) A model of corporate financing decisions. *The Journal of finance.* Vol. 32, pp. 1467-1484.

Titman, S. and Wessels, R. (1988) The Determinants of Capital Structure Choice. *Journal of Finance*, Vol. 43, 1988, pp. 1–19.

Trezevant, R. (1992) Debt Financing And Tax Status – Tests Of The Substitution Effect And The Tax Exhaustion Hypothesis Using Firms Responses To The Economic Recovery Tax Act

Of 1981, *The Journal of Finance* 47, 1557-1568.

Um, T. (2001) Determination of Capital Structure and Prediction of Bankruptcy in Korea, [online] Available from: <http://www.dmut.net/enshowpaper.aspx?id=43196>[29 July 2013]

Wald, J. K. (1999) How firm characteristics affect capital structure: an international comparison, *Journal of Financial Research* 22(2), 161-187.

Warner, J. (1977). Bankruptcy Costs: Some Evidence. *Journal of Finance,* 32, 337-347.

Williamson.O. E. (1988) Corporate Finance and corporate governance, *Journal of Finance,* Vol.43, pp 567.

Wiwattanakantang, Y. (1999) An empirical study on the determinants of the capital structure of Thai firms, *Pacific-Basin Finance Journal* 7, 371-403.

Appendix I The Results of Data Analysis

	leverage
	b/se
nds	-1.101
	(0.055)
tangibility	-0.005*
	(0.046)
profitability	-0.035**
	(0.008)
size	0.057
	(0.149)
growth	0.029***
	(0.000)
liquidity	0.008
	(0.081)
z	-0.020**
	(0.005)
fcf	0.549
	(1.620)
industrials	1.066
	(0.498)
information technology	-0.110
	(0.550)
materials	0.467
	(0.678)

utility	1.275
	(0.656)
_cons	-0.524
	(2.534)
r2	0.2278
N	3884

t statistics in parentheses

* p<0.05, **p<0.01, ***p<0.001

Appendix II Test for Normal Distribution

```
. swilk error

                    Shapiro-Wilk W test for normal data

    Variable |   Obs       W           V         z       Prob>z
-------------+--------------------------------------------------
       error |  3884    0.87749    264.839    14.522    0.00000

. sfrancia error

                  Shapiro-Francia W' test for normal data

    Variable |   Obs       W'          V'        z       Prob>z
-------------+--------------------------------------------------
       error |  3884    0.87637    285.781    14.106    0.00001

. sktest error

                     Skewness/Kurtosis tests for Normality
                                                      ------- joint ------
    Variable |   Obs   Pr(Skewness)   Pr(Kurtosis)  adj chi2(2)    Prob>chi2
-------------+-------------------------------------------------------------
       error |  3.9e+03   0.0000         0.0000            .          0.0000
```