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DETERMINANTS OF CAPITAL STRUCTURE: AN EMPIRICAL STUDY OF VIETNAMESE LISTED FIRMS

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ABSTRACT

This study examines the factors that potentially affect the financial leverage of listed firms on Vietnamese stock exchanges, and identifies the key determinants of the capital structure of these firms. The paper also explores the capital structure theories and how they explain capital structure decisions of firms worldwide and in Vietnam. Based on a sample of 183 non-financial publicly-traded firms from 2009 to 2013, this study uses the estimation method with fixed-effects model (FEM) to deliver the most reliable factors, and a pooled OLS method to assess the impacts of industry classification. The initial nineteen explanatory variables represent the factors that potentially determine capital structure: business risk, profitability, firm size, growth opportunities, tangibility of assets, uniqueness of assets, taxes, non-debt tax shields, industry condition, stock market condition, debt market condition, and macroeconomic condition.

This study identifies that the most reliable and important factors that determine the use of debt by Vietnamese listed firms are firm size (+), inflation rate (+) as a proxy for macroeconomic condition, tangibility of assets (+), business risk (+), stock market return (+) as a proxy for stock market condition; followed by the moderately influential factors, including profitability (–), growth opportunities (–/+), industry mean leverage (+) as a proxy for industry condition, average lending rate (+/–) as a proxy for debt market condition, and uniqueness of assets (+). This study maintains that industry classification plays an important role in a firm's leverage. There is strong evidence of a higher level of debt for firms belonging to Construction, Construction Materials, Real Estate industries and Mineral industries, followed by Manufacturing, Steel, and Plastics and Packaging industries. Whether or not firms belong in highly regulated industries also affects their capital structure.

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CHAPTER 1: INTRODUCTION

A. BACKGROUND

Financial capital is necessary to finance firm operations and investments. Any firm needs to consider raising capital from two main sources, either borrowing from the debt market or using equity. The mixture of debt and equity used to finance the firm's assets is referred to as the "capital structure" of a firm. A firm often sets its own target capital structure, which specifies the desired financing structure, including how much the firm will borrow, what kinds of debt it will carry, and how much capital the shareholders must contribute. In making such a financing decision, firms attempt to choose the best financing combination which can maximize firm value and work best with the projects they are investing in. Yet, the existence of such an optimal capital structure has been a topic long disputed among scholars.

The factors affecting capital structure have been a popular topic of research, both theoretically and empirically, around the world. The most commonly identified determinants of capital structure include profitability, firm size, growth opportunities, tangibility of assets, uniqueness of assets, volatility, taxes, industry condition, stock market condition, debt market conditions, inflation and other macroeconomic factors. However, these capital structure determinants do not always hold similarly across different contexts.

B. STATEMENT OF PROBLEM

The seminal work of Modigliani and Miller (1958) established the basis for the modern paradigm of capital structure, in which the influence of capital structure on a firm's value was examined on the basis of certain assumptions. Specifically, their theory suggested that in the absence of taxes, bankruptcy costs, agency costs, asymmetry information, and in an efficient market, the value of a firm is unaffected by how the firm is financed. However, with presence of taxes and ignoring other elements, the value of a firm is positively related to the use level of debt financing, because the more debt used, the higher the value of tax shields.

Following Modigliani and Miller (1958), several theoretical studies have been developed on the topic of capital structure. For example, in 1977, Myers brought a totally different idea relating to the effects of growth opportunities on corporate borrowing behavior. Jensen and Meckling (1976) defined the *agency relationship*, the agency costs of equity and debt, and the trade-off that owners and managers face in making decisions between inside and outside equity and debt. Another stream of research was initiated by Ross (1977) on how the choice of a firm's capital structure can signal information to outside investors about the company, i.e. issuing large debt levels is a signal of higher quality of the firm. The work of Myers and Majluf (1984) provides an explanation as to why firms have a

tendency to rely on internal sources of funds, and prefer debt over equity when external financing is needed.

With regards to empirical work, Titman and Wessels (1988), using data on U.S. companies over the 1974 to 1982 period, made one of the earliest attempts to extend empirical study on capital structure by examining a broad range of theoretical determinants of capital structure. Following this, Rajan and Zingales (1995) investigated the determinants of capital structure decisions on a broader scope of major industrialized countries, leveraging the findings of previous studies of U.S. firms.

It can be clearly seen that both theoretical and empirical work has made progress in determining what factors influence corporate financing decisions. Yet, Titman and Wessels (1988), Rajan and Zingales (1995), and Harris and Raviv (1991) agreed on the fact that, while progress has been made from the initial work of Modigliani and Miller in 1958, the empirical work was lagging behind and doing very little to identify empirical findings of capital structure in practice. While theoretical work had identified a large number of potential determinants of capital structure, empirical studies have not frequently considered various contexts outside the G-7 countries.

In recent years, empirical studies on capital structure determinants have been largely extended to different developed and developing countries including

Holland (Chen, Lensink, & Sterken, 1998), Korea (Kim, Heshmati, & Aoun, 2006), Japan (Cortez & Sunanto, 2012), Czech Republic (Bauer, 2004), and Egypt (Eldomiaty, 2007). They identified both similarities and discrepancies in what factors influence firm financing decisions across different contexts.

As an emerging market in the Southeast Asia, Vietnam's economy differentiates itself with unique features. Having transformed from a highly centralized planned economy to a socialist-oriented market economy through the Doi Moi economic reforms policy initiated during the 1980s, Vietnam has achieved a combined effect of economic reforms. These changes include enhancing international economic integration, joining the World Trade Organization (WTO) by the end of 2006, and going through a rapid phase of economic development in terms of investment, trade, and financial system. Vietnam successfully implemented economic restructuring programs, especially the successful equitization process of state-owned companies. The participation in the WTO in the end of 2006 and blooming capital markets – mainly the stock market – have increased the capital needs of Vietnamese firms, while at the same time providing them with a variety of fund raising options in order to meet capital requirements. However, due to a newly established and small-sized stock market, firms have been relying on bank credit as their main funding source. Yet credit institutions face tougher competition, low liquidity and high level of bad debt and

information asymmetry while the bond market is still highly underdeveloped. The financial crisis in 2008 has negatively affected the capital market in Vietnam, by contributing to high inflation, tightening credit by credit institutions, and changing regulatory laws regarding taxes. This has created many difficulties for firms and has increased bankruptcies. Since the end of 2013, the capital market has been recovering, as indicated by lowered inflation, reduced interest rates, and a more active stock and bond market.

While understanding the factors influencing the financing decision of Vietnamese firms is highly important, there have been only a few well-known published studies on the topic of capital structure determinants of listed firms. These included a study by Anh and Yen (2014), focusing only on firms on the Ho Chi Minh Stock Exchange (HOSE), and Phi Anh (2010) and Chi (2013), who conducted a study on a broad set of Vietnamese listed firms. Although these studies have contributed to our understanding of capital structure in Vietnam, they are still in disagreement over the basic determinants of capital structure, and possess certain limitations such as lack of factors, limited time horizon, and small sample size.

More effort needs to be made to explore the capital structure decisions of Vietnamese firms in order to provide a more accurate and thorough analysis for the use of researchers and practitioners. This study intends to contribute to the

literature on this subject by examining the determinants of firm capital structure in Vietnam – one of the notable developing markets.

This paper is considerably different from other previous capital structure studies of Vietnamese firms. *Firstly*, this study covers a much larger set of potential capital structure determinants, including those that have never or hardly ever been incorporated in previous studies. For example, business risk, uniqueness of assets, non-debt tax shields, industry classifications, stock market conditions, and debt market conditions, which are discussed in detail in Chapter 2. *Secondly*, in contrast to previous studies, this study uses four different leverage measures instead of only one, and determines factors that affect each, making for a significantly more comprehensive analysis. *Thirdly*, this study uses a larger data set in a longer time horizon, increasing the number of observations, compared to the majority of previous studies. The main data set covers a five-year period; however, some data has been collected over a seven year period for the purpose of calculating the values of variables. The sample size is relatively large and includes firms from both stock exchanges in Vietnam: Hanoi Stock Exchange and Ho Chi Minh Stock Exchange. *Finally*, the methodology used for the panel data has been improved upon and updated with a thorough analysis of different models and tests.

C. PURPOSE OF STUDY

This study sets out with three purposes: 1) to explore the theoretical framework of capital structures including the most advocated theories that explain capital structure decisions of firms, 2) to determine the relationship between leverage and specific potential factors based on theoretical and empirical findings, and identify the most reliable empirical determinants of the capital structure for Vietnamese listed firms, 3) to build core leverage models that show the relationship between leverage and the influential factors, and help to estimate the level of debt financing of firms in Vietnam.

D. JUSTIFICATION FOR STUDY

This study was conducted bearing in mind the need for more research on both empirical capital structure in emerging or developing markets in general, and Vietnam in particular. The financing activities of firms in developing markets are subjected to less developed and less efficient capital markets than that of firms in developed countries. Also, the level of information transparency is low in such markets; thus, information asymmetry affects the financing decisions of firms differently from developed markets.

Due to incomplete capital markets, companies in emerging/developing markets are not able to follow the clear capital structure approaches that have been explained by widely-known theories. Therefore, examining the

determinants of capital structure in such countries as Vietnam is highly important in an attempt to understand the capital structure behaviors of firms and factors influencing capital structure decisions in emerging/developing markets and to compare these with those of developed markets.

E. ORGANIZATION OF STUDY

This paper is composed of five chapters:

1) Chapter 1 (Introduction) is an introduction to the study, including a brief background, statement of the problem, purpose and justification of the study.
2) Chapter 2 (Literature Review) provides a review of current theoretical and empirical research that has been conducted on the topic of capital structure and its determinants.
3) Chapter 3 (Research Methodology) presents the descriptions of variables and their measurement studied in this paper and the methodology of sampling and data analysis.
4) Chapter 4 (Results of the study) provides the main analysis including descriptive analysis, correlation matrix, and regression analysis, and how it leads to the main findings.
5) Chapter 5 (Summary of the study) summarizes the main points of the study and presents the limitations and ideas for future research.

CHAPTER 2: LITERATURE REVIEW

A. THEORETICAL FINDINGS

In their review paper, Harris and Raviv (1991) synthesized literature that proposed theories on the determination of capital structure. They concluded that theoretical works have identified a large number of potential capital structure determinants. They also pointed out that, although these findings rest on a small number of "general principles", they vary significantly in the predictions of how firms make financing decisions. Myers (2001, p. 82) asserted that "There is no universal theory of the debt-equity choice, and no reason to expect one. There are several useful conditional theories, however." and that "Each emphasizes certain costs and benefits of alternative financing strategies" (p. 99). With respect to the recognition of the existence of an optimal capital structure, theories can be grouped in two categories; the first category includes trade-off theory, agency theory, and free cash flow theory, which predict that there is an optimal level of debt for each firm. The second category includes pecking order theory and equity market timing theory, which argue against the existence of an optimal capital structure.

Trade-off theory, agency theory, and free cash flow theory

Capital structure theories have been largely based on trade-off models to predict an optimal debt-equity choice that happens as a result of trade-offs

between benefits and costs of borrowing. *Firstly*, Myers (1984) and Bradley, Jarrell, and Kim (1984) discussed the trade-off between tax advantage provided by debt, measured by the debt tax shields or tax saving, and the cost of using debt, measured by the financial distress, or the bankruptcy costs. According to Myers (1984), a firm obtains its optimal capital structure at the debt ratio where the debt tax shield balances the financial distress costs. This theory leads to the qualitative prediction that firms with lower tax advantages or higher bankruptcy costs should use less debt financing. *Secondly*, the agency theory, as discussed in the seminal work of Jensen and Meckling (1976) and Myers (1977), focuses on the trade-off between agency costs – including agency cost of equity arising from the relation between stockholders and managers and agency cost of debt arising from the relation between stockholders and debtholders. The optimal capital structure is the debt-equity level at which the firm achieves the lowest total agency cost. *Thirdly,* the free cash flow theory, also related to agency theory, focuses on the trade-off between the impact of debt financing on mitigating agency problems via cutting managerial discretion on available free cash flows (Jensen, 1986) and the cost of financial distress. In firms that generate substantial free cash flow, debt forces managers to effectively meet their promise to pay out future cash flows rather than invest in unprofitable projects or organizational inefficiencies, and can be an effective substitute for dividends (Jensen, 1986).

Pecking order theory and market timing theory

The pecking order model was outlined by Myers and Majluf (1984) and Myers (1984). Based on the observed behaviour of firms, they predict the tendency of firms to prefer internal funding sources to external sources, and, when it becomes necessary for firms to seek external financing, to prefer debt over equity. Myers and Majluf (1984) asserted that information asymmetry affects financing choices between internal and external, debt and equity choice. Based on their knowledge of information about the firm that outsiders are not privy to, managers make external financing decisions in reflection of what they believe to be the true value of the firm. This action sends signals to the market – for example, issuing new equity signals that the stock is overvalued, while using more debt is a positive signal that the firm is confident about its future prospects. According to the pecking order theory, changes in leverage are determined by the need for external funds, not by optimal capital structure decisions. Thus, it concludes that there is no well-defined target debt ratio.

The market timing theory, according to Baker and Wurgler (2002), is about the timing at which firms implement actions that maximize stock value based on market conditions at different points in time (i.e. issuing equity or debt). Baker and Wurgler (2002, p. 2) stated that "market timing has large, persistent effects on capital structures", specifically "low leverage firms are those that raised funds

when their market valuations were high", "while high leverage firms are those that raised funds when their market valuations were low." Whether or not funds are raised is dependent on the needs of the firm, but strongly relates to the debt and equity market condition; thus, there is no well-defined optimal capital structure.

B. EMPIRICAL FINDINGS

Empirical testing of the determinants of capital structure has been conducted with a focus on firms in developed countries, especially the United States. The standout studies include Bradley et al. (1984), based on a sample of 851 firms in 20 years from 1962 to 1981, Titman and Wessels (1988), based on 469 firms from 1976 to 1982, Long and Malitz (1985), on a set of 545 firms from 1978 to 1980, and Frank and Goyal (2009), a study over a 50 year time horizon from 1950 to 2003.

Some key findings on U.S. firms include those provided by Titman and Wessels (1988) who analyzed a broad set of capital structure theories and different measures of debt, including short-term, long-term, and convertible debt rather than an aggregate measure of total debt. Their results showed that uniqueness, transaction costs, and firm sizes are influential factors, while non-debt tax shields, volatility, collateral value, and future growth are not related to leverage. Expanding on such findings, Frank and Goyal (2009) considered a larger

set of factors with the potential to affect capital structure decision, including profitability, firm size, growth, industry conditions, nature of assets, taxes, risk, supply-side factors, stock market conditions, debt market conditions, and macroeconomic conditions. The six identified reliable factors to market-based leverage are industry conditions (industry median leverage), growth (market to book ratio), nature of assets (tangibility), profitability (profit), firm size (book value of assets), and debt market conditions (inflation).

With regard to other major industrialized countries, Rajan and Zingales (1995) conducted a study on public firms in G7 countries. Toy, Stonehill, Remmers, and Beekhuisen (1974) investigated the determinants of capital structure across France, Japan, the Netherlands, Norway, and the United States, representing one of the earliest efforts to conduct a cross-country study. Chen, et al. (1998) conducted an investigation of how the main theories on capital structure can explain capital structure choices of Dutch firms and identified the determining factors. In Canada, Nunkoo and Boateng (2010) studied empirical determinants of capital structure of Canadian firms listed on the Toronto stock exchange during the period from 1996 to 2004. The results showed a positive and significant impact of profitability and tangibility, and a negative influence of growth opportunities and size on the leverage of Canadian firms.

Empirical work also extends to Holland (Chen et al., 1998), China (Huang & Song, 2002), Korea (Kim et al., 2006), Japan (Cortez & Sunanto, 2012), Czech Republic (Bauer, 2004), and Egypt (Eldomiaty, 2007). Cross-country research continues to be performed, for example, a comparison of capital structure determinants between the United States and the Republic of Korea is made in a study by Kim and Berger (2008).

In Vietnam, there have been few credible published studies on the topic of capital structure determinants. The most notable work was conducted by Chi (2013), on a sample consisting of 178 non-financial companies listed on the Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX) from 2007 to 2010. The study used the Bayesian Model Averaging (BMA) method for factor selection and regression with pooling model on a sample consisting of 178 non-financial companies listed on HOSE and HNX from 2007 to 2010. They found that there are six factors affecting the capital structure decisions of firms, including macroeconomics factors (tax rate, inflation), internal factors (market to book ratio, profitability), and industry factors (industry leverage), and behavior of managers. Chi (2013) also concluded that there is strong evidence suggesting that pecking order theory influences capital structure decisions, and no evidence found for the trade-off theory.

Phi Anh (2010) tested the determinants of capital structure and its effect on financial performance, using 428 listed companies on Vietnamese stock exchanges, the largest sample size in Vietnam's capital structure literature. This paper employed a different technique – path analysis – and pointed out that profitability, business risk, asset structure, and firm size are factors influencing a firm's debt ratio. This study only agrees with Chi (2013) regarding the inverse relationship between profitability and leverage.

In a more recent study, Anh and Yen (2014) identified the factors affecting capital structure decision of firms listed on the Ho Chi Minh Stock Exchange (HOSE), based on 180 non-financial companies. Based on the fixed effect estimation method, the study pointed out three main determinants of leverage, including firm size, profitability, and taxes. Despite the fact that this study was conducted on only HOSE, whereas Chi (2013) studied both HOSE and HNX, both papers conclude that profitability and taxes have an influence on leverage; however, they disagree over the direction of the relationship. Chi (2013) asserted that return on assets, as a proxy for profitability, has a negative relationship with leverage consistent with the pecking order theory, and tax rate has a positive relationship with leverage, following the trade-off theory. Meanwhile, Anh and Yen (2014) found a positive correlation between profitability and financial leverage and a negative correlation between taxes and financial leverage. Similar

to the results presented by Phi Anh (2010), the findings of Anh and Yen (2014) show the positive influence of profitability and firm size on leverage.

In addition, Okuda and Nhung (2012) conducted research on capital structure and investment behavior on a sample of 299 non-financial companies listed on the HOSE and HNX for two continuous years (2008 and 2009). The findings regarding capital structure determinants include: 1) Standard corporate financing theories may be suitable to explain the capital structure of listed companies in Vietnam; 2) There are differences between the determinants of long-term fund-raising and the determinants of short-term fund-raising, in which profitability is important for short term financing decisions while tangibility of assets determines long term financing decisions; 3) State-controlled firms have an advantage in reducing agency costs, thus, they tend to borrow more than non-state-owned firms; 4) Companies on HOSE are less dependent on borrowed funds than those on HNX. Okuda and Nhung (2012) suggested that state ownership and the market at which the stock is listed might affect firm financing decisions.

In earlier research, Nguyen and Ramanchandran (2006) attempted to identify the determinants influencing the capital structure of small and medium-sized enterprises (SMEs) in Vietnam, using a stratified random sample of 558 SMEs over the period 1998-2001, of which 176 are state-owned and 382 are private. This research points out that the capital structure of SMEs in Vietnam is

positively related to growth, business risk, firm size, networking, and relationships with banks – but negatively related to Tangibility. Profitability seems to have no significant impact on the capital structure of Vietnamese SMEs.

Overall, despite that empirical work on capital structure in Vietnam has pointed out some of the critical determinants of the capital structure of firms, it has not been sufficient to provide the most conclusive findings. This is true for a number of reasons: 1) there is a lack of detailed literature review on theoretical and empirical capital structure studies; 2) there are notable limitations in the sampled data, including a short time horizon and not always covering firms on both stock exchanges; 3) there is inconsistency in financial leverage measures and factor measures; 4) there are a small number of determinants being studied, (i.e. many factors that were pointed out by theory and international empirical research still have not been included), 5) there is limited access to data such as data on non-listed firms and data on corporate governance, and 6) there is insufficient estimation of the core leverage model.

This study deals with such limitations by the following measures: 1) providing a more complete review of capital structure literature with both theoretical and empirical findings from international and Vietnamese studies; 2) expanding the studied time period to five years – from 2009 to 2013 – and using data collected for firms in both stock exchanges, making it possible for a larger

number of observations; 3) incorporating a larger set of potential capital structure determinants and using a number of different leverage measures that bring more perspectives on the capital structure behaviors of firms; 4) delivering the core leverage factors in core leverage models that influence each leverage measure separately.

C. DETERMINANTS OF CAPITAL STRUCTURE

The survey done by Harris and Raviv (1991) presented the main findings of nine studies on firm and industry characteristics that affect capital structure. These studies are: Bradley et al. (1984), Chaplinsky and Nichaus (1990), Friend and Hasbrouck (1988), Friend and Lang (1988), Gonedes, Lang, and Chikaonda (1988), Long and Malitz (1985), Kester (1986), Kim and Sorensen (1986), Marsh (1982), and Titman and Wessels (1988). Harris and Raviv (1991) pointed out that these studies generally agree on following determinants of capital structure: volatility (–/+), bankruptcy probability (–), fixed assets (+), non-debt tax shields (+/–), advertising (–), R&D expenditures (–), profitability (–/+), growth opportunities (–/+), size (–/+), free cash flow (–), and uniqueness of product (–). [1] Despite taking the above factors into their consideration, Frank and Goyal (2009) extracted a longer list of capital structure determinants in which additional factors are industry leverage, industry classification, tangibility of assets, taxes,

[1] The sign (+) or (–) shows the direction of the relationship (direct/positive or inverse/negative)

debt rating, stock market condition, debt market condition, and macroeconomic condition.

Based on the existing literature and data availability, the following potential determinants of capital structure are analysed in this study.

1. Business risk

Volatility of earnings or cash flows is the measure of risk that a firm faces, especially business risk. Titman and Wessels (1988, p. 6) confirmed in their study that "many authors have also suggested that a firm's optimal debt level is a decreasing function of the volatility of earnings". A similar argument is presented by Frank and Goyal (2009). More risky cash flows resulting from cyclicality or seasonality of business lines will reduce the benefits of tax shields; thus, trade-off theory would support a negative relation between volatility and leverage. Also, firms with volatile cash flows will also want to avoid making large fixed commitments for debt holders. The higher expected costs of financial distress make it less appealing to have high leverage, according to trade-off theory.

On the other hand, Frank and Goyal (2009) mentioned that firms with high volatility in earnings can be regarded in the financial markets as having poor management or problems in business lines, resulting in volatile stock prices. With higher information asymmetry associated with riskier firms, the pecking order theory would suggest that these firms have higher leverage.

Empirical studies reported conflicting results. While some authors (Bauer, 2004; Phi Anh, 2010) pointed out a negative relationship between volatility and leverage, other authors (Huang & Song, 2002; Nguyen & Ramachandran, 2006) showed a positive impact. Meanwhile, Rajan and Zingales (1995) did not take this factor into account, and Titman and Wessels (1988) did not provide any significant results for the volatility factor. Besides Phi Anh (2010) and Nguyen and Ramachandran (2006), no other authors in Vietnam have included volatility in their study of capital structure.

2. Profitability

From the theoretical viewpoint, profitability has been found to have inconsistent influences on financial leverage. Trade-off theory and free cash flow theory predict a positive relationship between profitability and leverage. According to the trade-off theory, profitable firms benefit more from interest tax shields and face lower expected costs of financial distress, so these firms are likely to use more debt (Myers, 1984; Bradley et al., 1984).

In addition, Jensen (1986) asserted that managers with substantial free cash flow tend to make weak promises to pay dividends and may waste cash or spend it on low-return projects. According to Jensen (1986, p. 325), using debt enables managers to “effectively bond their promise to pay out future cash flows”, and thus reduces conflicts of interest between shareholders and

managers. The higher the profitability a firm may have, the larger the free cash flow it generates, making the conflicts more severe. Therefore, the use of debt is more valuable for profitable firms in controlling agency conflicts. For the above reasons, the free cash flow and agency theories suggest a positive relationship between profitability and leverage.

On the other hand, Myers and Majluf (1984) predicted a negative relationship between profitability and leverage based on the pecking order theory. Profitable firms are likely to accumulate more retained earnings as a source of internal funds, and will therefore need less debt overtime.

Empirical studies also do not totally agree on one particular conclusion. The majority of them, however, observed an inverse relationship between profitability and leverage, for example Titman and Wessels (1988), Rajan and Zingales (1995), and Frank and Goyal (2009) for U.S. firms, Huang and Song (2002) for Chinese firms, Bauer (2004) for Czech firms, Bauer (2004) for Visegrad firms, Cortez and Susanto (2012) for Japanese firms, and Kim et al. (2006) for Korean firms. In contrast, some authors found a positive relation between profitability and leverage, for example, Nunkoo and Boateng (2010) for Canadian firm. The literature also indicates conflicted findings on how profitability influences the use of debt with Vietnamese listed firms. While Chi (2013) and Phi Anh (2010)

pointed out an inverse relationship, Anh and Yen (2014) identified a positive relationship.

3. Firm Size

Firm size has an influence on capital structure, regardless of the fact that the relationship remains unclear according to theoretical predictions. Larger and older firms are more likely to be financially and operationally stronger, so these firms are less likely to go bankrupt (Rajan & Zingales, 1995). Mature firms are also able to issue debt at lower costs due to their better reputation in the financial market. These reasons explain why larger firms often take on more debt than smaller firms, according to trade-off theory.

By contrast, the pecking order theory (Myers & Majluf, 1984) argues that large firms are likely to disclose more information to the public or outside investors, and are better known than small firms, thus, having less asymmetric information. Equity financing will therefore be more favorable compared to debt, as the negative signal of issuing new shares is limited due to a higher level of information transparency for larger firms. Small firms may pay higher transaction costs than large firms to issue new shares, thus, are more likely to prefer debt (Titman & Wessels, 1988). Also, the pecking order theory suggests a negative relationship between firm size and leverage, seeing as older firms often build more retained earnings as a source of internal equity financing.

Some empirical studies confirm a positive relationship between firm size and leverage, including Rajan and Zingales (1995), Huang and Song (2002), Bauer (2004), Frank and Goyal (2009), and, especially, Phi Anh (2010) and Anh and Yen (2014) for Vietnamese firms. Meanwhile, other studies find a negative relationship between firm size and leverage, including Titman and Wessels (1988) and Nunkoo and Boateng (2010). Chi (2013) found no evidence of the influence of size on leverage for Vietnamese firms.

4. Growth opportunities

Theories provide contrasting predictions on the relationship between growth opportunities and debt ratio. First, according to Myers and Majluf (1984), the pecking order theory implies a positive relationship between expected growth and leverage because firms with higher growth opportunities need more funds to finance their projects. When internal financing cannot meet capital needs, these firms will need more external financing, particularly debt, according to the order of preference. Second, Smith and Watts (1992) proposed the signalling hypothesis which indicates that firms with more growth opportunities face greater information asymmetry; thus, these firms should be highly levered in order to signal their quality to the market.

On the other hand, Myers (1977) argued that firms having higher growth options often bear higher financial distress costs in case of bankruptcy, have

lower free cash flow problems, and incur severe debt-related agency problems. Smith and Watts (1992) proposed a counter argument to the signalling hypothesis. They argued that managers might not undertake positive net present value projects because they will lose payoffs to debt holders who hold senior claim on the cash flows. This leads to underinvestment problems, first recognized by Myers (1977). It can be inferred that, to control this problem and avoid losing shareholders' value, firms may find it preferable to finance growth opportunities with equity rather than debt. Hence, the larger the portion of firm value represented by growth opportunities, the lower the assets-in-place – and thus, the lower the level of debt. In addition, firms with better growth prospects often have less free cash flow. Such firms will not need to choose a higher level of debt as firms with more free cash flow often do in order to commit to paying out excess cash. Trade-off theory, agency theory, and free cash flow theory therefore suggest that the level of debt used by a firm is inversely related to its growth opportunities.

In the same manner, empirical findings provide two opposite directions in the relationship between growth opportunities and leverage. Rajan and Zingales (1995), Titman and Wessels (1988), Bauer (2004), Frank and Goyal (2009), Nunkoo and Boateng (2010), and Chi (2013) confirmed that growth has a negative on leverage; while Huang and Song (2002) identified a positive relationship

between growth and leverage. As far as Vietnamese firms are concerned, Chi (2013) indicated that growth opportunities, measured by book to market ratio, is a capital structure determinant. However, Anh and Yen (2014) and Phi Anh (2010) found no evidence to support such relationship.

5. Tangibility

According to Bradley et al. (1984), firms that invest heavily in tangible assets can use debt at a lower borrowing cost because these firms can use the tangible assets as collaterals. Outsiders find it easier to value tangible assets such as property, plant, and equipment than intangibles such as goodwill. Also, Smith and Warner (1979) and Long and Malitz (1985) discussed the assets substitution problem by pointing out that high tangible asset investment will mitigate asset substitution problems as it is more difficult for shareholders to exchange the firms' low-risk assets than high-risk ones in order to gain value from debt-holders. Therefore, with lower expected costs of financial distress and fewer debt-related agency problems, the tangibility of the firms' assets and firm leverage are likely to have a positive relationship. On the other hand, Bradley et al. (1984) and Long and Malitz (1985) argued that firms making large discretionary expenditures such as SG&A expenses and R&D expenses often possess more intangible assets, and, thus, are less levered.

Harris and Raviv (1991) claimed that, according to the pecking order theory, firms with few tangible assets would have greater asymmetric information problems; thus, such firms will tend to accumulate more debt over time and become highly levered. Issuing equity will be a better choice for firms with large tangible assets because of low information asymmetry. This suggests a negative relationship between tangibility and leverage.

Empirical research has reported conflicting results. A positive relationship between tangibility and leverage is found in some studies such as Rajan and Zingales (1995), Frank and Goyal (2009), Huang and Song (2002), Cortez and Susanto (2012), Nunkoo and Boateng (2010), and Okuda and Nhung (2012) for Vietnamese firms. On the other hand, a negative relationship is observed in studies such as Bauer (2004), and Nguyen and Ramachandran (2006) for Vietnamese firms. There is no evidence of any relationship reported by Titman and Wessels (1988), Chi (2013), Anh and Yen (2014), and Phi Anh (2010) in Vietnam.

6. Uniqueness

Theory predicts that uniqueness is negatively related to leverage. Titman (1984) argued that firms that operate in a unique market and produce unique goods and services often make specialized capital expenditures and labor investments with high R&D and large SG&A expenses. These firms face higher

financial distress costs because it is harder to liquidate inventory, machines, and other assets, making a lower expected value recoverable by a lender in case of bankruptcy. Therefore these firms have lower debt capacity.

Empirical work has found little evidence of the relationship between uniqueness and leverage, except for Titman and Wessels (1988) who reported an inverse relationship between uniqueness and debt ratio. Remarkably, studies on Vietnamese firms have not taken this factor into account as a potential capital structure determinant.

7. Taxes and non-debt tax shields

The trade-off theory predicts higher leverage when a firm is forced to pay higher taxes on its earnings. The higher the taxes firms pay, the higher the value of debt tax shields firms can gain, as suggested by Myers (1984). Furthermore, non-debt tax shields such as accounting depreciation, depletion allowances, and investment tax credits have been found to have a negative influence on leverage because they act as substitutes for the benefit of debt financing coming from interest tax shields (DeAngelo & Masulis, 1980).

Empirical research has shown support for the above predictions regarding the relationship between taxes and leverage, although it is not one of the most popular factors. Bauer (2004) and Chi (2013) found that taxes have a positive influence on the use of debt, yet, the impact of taxes does not always hold. For

example, Anh and Yen (2014) identified a negative relationship that can be seen by the observation that firms in countries without corporate taxes are still using debt financing.

Non-debt tax shields, often relating to depreciation and other operating expenses, are observed in the empirical work of Bauer (2004), Huang and Song (2002), and Cortez and Susanto (2012) to have a negative relationship with leverage. This is consistent with what theory suggests.

8. Industry Condition

Several studies confirm the existence of a link between industry leverage and firm leverage. Bradley et al. (1984, p. 858) found that "the permanent or average firm leverage ratios are strongly related to industry classification" and this relationship remained true even after excluding regulated firms. Harris and Raviv (1995, p. 333) also found this relationship as "the most basic stylized facts concerning industry characteristics and capital structure". Moreover, their study supported the general conclusion of previous studies that drugs, instruments, electronics, and food are industries with consistently low leverage, while paper, textile, mill products, steel, airlines, and cement are those with consistently high leverage. This relationship can be explained by the assertion that firms operating within an industry are affected by similar industry factors in their leverage decisions, such as business risk, regulation, market forces, and investment

opportunities. Another reason for this relationship is that many firms have the tendency to choose the industry median leverage as a proxy for their target capital structure or adjust their capital structure according to the industry average.

Empirical studies such as Long and Malitz (1985), Frank and Goyal (2009), Bauer (2004) also observed this relationship. One exception is Chi (2013), who found a statistically significant relationship between industry leverage and firm leverage. Studies of Vietnamese firms have not included industry classifications.

9. Stock Market Condition

According to the market timing hypothesis, as discussed by Baker and Wurgler (2002), managers are aware of equity market timing in financing decisions. Baker and Wurgler (2002, p. 1) stated that "current capital structure is strongly related to historical market values" in the way that "firms are more likely to issue equity when their market values are high, relative to book and past market values, and to repurchase equity when their market values are low." This suggests a negative relationship between stock return and leverage.

On an empirical note, Graham and Harvey (2001) pointed out that managers admitted to attempting to capture the right timing with the stock market and that this serves as one of the most important considerations in financial decision-making. Two thirds of managers believed that whether a firm

issues more or repurchases its stocks depends on whether the stock is undervalued or overvalued. Also, Welch (2004) discovered that U.S. firms do not have actions to respond to the effects of stock price changes on their capital structure, which makes debt-equity ratios move closely with fluctuations in stock prices. Thus, roughly 40% of the changes in debt ratio can be explained by stock returns over the five-year horizons (Welch, 2004). It is suggested that market return is among important factors affecting the capital structure of listed firms.

Despite being identified as an important factor deciding the timing of equity issues in many studies, stock market condition is not frequently used in empirical studies on the determinants of capital structure (including Vietnamese studies that have not mentioned stock market condition). Frank and Goyal (2009) contended that such a factor is not within the traditional scope of research.

10. Debt market condition

Kaya (2013, p. 114) summarized that "both equity market timing and debt market timing focus on the same question: do firms time their financing activities in order to reduce their cost of capital?" It has been observed that managers are aware of debt market timing in financing decision-making by their timing of financing activities in order to reduce the cost of capital. Empirical studies found that firms borrow more in the periods of relatively low interest rates due to the lower cost of borrowing (Taggart, 1977; Marsh, 1982; Barry, Mann, Mihov, &

Rodriguez, 2008). For this reason, it is predicted that interest rate and leverage have an inverse relationship.

On the other hand, it can be implied from the trade-off theory that increasing interest rates will make tax shields more valuable by providing more debt tax shields to firms. This supports a positive relationship between interest rate and leverage.

11. Macroeconomic Conditions

In terms of the tax advantage mentioned in the trade-off theory, inflation affects the real values of tax savings on debt. When inflation is high, the tax advantage is more valuable (Taggart, 1985). Thus, the trade-off theory suggests a positive relationship between leverage and expected inflation. Also, market timing theory predicts that high inflation leads to higher leverage because inflation leads to a lower real cost of debt – this pushes the demand for corporate bond issuance during the inflationary periods.

With respect to empirical findings on the impact of inflation on leverage, Frank and Goyal (2009) reported a positive impact for U.S. companies, while Chi (2013) demonstrated the negative impact of inflation on leverage for Vietnamese firms. Other than Chi (2013), no studies have researched the impact of inflation on capital structure.

CHAPTER 3: RESEARCH METHODOLOGY

A. DEFINITION OF VARIABLES

Measures of capital structure

A firm can issue different types of securities in its financing mix, including short-term debt, long-term debt, convertible debt, preferred stock, and common stock. The term "leverage" used in capital structure research refers to financial leverage, not operating leverage or total leverage. When a company has no debt in its capital structure, it is said to be "unlevered"; when it has debt, the company is "levered" or *leveraged*.

Rajan and Zingales (1995) mentioned that the extent of leverage and the relevant measure of leverage depends on each research objective, which has created a number of different measures of financial leverage and a long held discussion surrounding how leverage should be measured. When studying problems with agency, Jensen and Meckling (1976) and Myers (1977) were concerned about how the firm has been financed and the relative claims on firm value held by equity and debt – thus using the stock of total debt relative to firm value. Titman and Wessels (1988) separated short-term debt and convertible debt in an attempt to find the independent attributes that vary with debt maturity features. They used six measure of capital structure by taking long-term, short-term, and convertible debt divided by market or book values of equity.

Rajan and Zingales (1995) asserted that the broadest definition of leverage (the ratio of total liabilities to total assets) fails to indicate whether the firm is at risk of default in the near future, or whether it provides a higher value than the real leverage – since total liabilities include items such as accounts payable which arise from transaction purposes, not financing purposes. The ratio of debt (as the sum of short-term and long-term debts) to total assets does not address the fact that current assets include those that can be offset by specific non-debt liabilities. Rajan and Zingales (1995) recommended that the best measures of leverage should be based only on debt and equity capital that firms raise for financing purposes.

Frank and Goyal (2009) used four leverage measures, based on whether they are derived from market value of equity or book value of equity, and if total debt or only long-term debt is considered. These measures were taken by dividing total debt or long-term debt by market value of assets or book value of total assets. However, these measures used total assets, therefore they do not address the above fact that Rajan and Zingales (1995) have mentioned.

To come to a conclusion on the best leverage measures, this study follows Rajan and Zingales (1995). After reviewing various leverage measures used in previous research, Rajan and Zingales (1995, p. 1429) concluded that "the effects of past financing decisions is probably best represented by the ratio of total debt

to capital (defined as total debt plus equity)." Hence, the most relevant definitions of leverage to use in this study include the ratios of total debt to capital – either in book value or market value – and the ratios of long-term debt to capital – either in book value and market value. These measures are identified below.

Table 1: Measures of leverage

Denotation	Dependent Variable	Calculation
TDM	Total Debt to Market Value of Capital Ratio	= Total debt[2] / (Total Debt + MV of Equity[3])
TDC	Total Debt to Book Value of Capital Ratio	= Total debt / (Total Debt + BV of Equity[4])
LDM	Long-term Debt to Market Value of Capital Ratio	= Long-term debt / (Total Debt + MV of Equity)
LDC	Long-term Debt to Book Value of Capital Ratio	= Long-term debt / (Total Debt + BV of Equity)

Measures of capital structure determinants

A complete set of the potential determinants of capital structure, the proxies to measure them, and the predicted effects on leverage are presented in Tables 2 and Table 3 below.

[2] Total debt includes Short-term debt in Current Liabilities, Current portion of long-term debt in Current Liabilities, and Long-term debt in Long-term Liabilities, all at book value, extracted directly from Balance Sheet.

[3] MV of Equity (denoting market value of equity) equals the adjusted closing price multiplies by the number of shares outstanding.

[4] BV of Equity (denoting book value of equity) is the Shareholder Equity extracted directly from Balance Sheet.

Table 2: Measures of capital structures determinants

Proxy	Factors	Calculation
ROA[5]	Profitability	EBIT (1-Tc) / Average Total Assets[6]; Average Total Assets = (Total Assets Year End $_{N-1}$ + Total Assets Year End $_{N}$)/2
SIZE	Size	Log (Total Assets)
GROWTH[7]	Growth opportunities	Market Value of Assets/ Book Value of Assets; Market Value of Assets = Market Value of Equity + Book Value of Liabilities
CAPEX[8]	Growth opportunities	Capital Expenditure / Total Assets
TANG[9]	Tangibility	Net Property, Plant, and Equipment / Total Assets
SGA[10]	Uniqueness	Selling, General & Administration Expense / Net Sales
TAX[11]	Average tax rate	Tax Expenses / Earning Before Taxes; EBT[12] = Tax Expenses + Net Income
DEPR[13]	Non-debt tax shields	Depreciation Expense / Total Assets
RISK	Business risk	Three-year rolling Standard Deviation of ROA; $RISK_n$ = Standard Deviation of ROA in year n-1, n, n+1
INDLEV[14]	Industry mean leverage	Industry average debt to capital ratio of eighteen different non-financial industries[15]

[5] ROA denotes Return on Assets.
[6] EBIT means Earnings before Interest and Taxes.
[7] GROWTH denotes Market to Book value of Assets.
[8] CAPEX denotes Capital Expenditure.
[9] TANG denotes tangibility as measured by Net Property, Plant, and Equipment, which equals Property, Plant, and Equipment (PPE) deducting Accumulated depreciation on PPE.
[10] SGA denotes Selling, General & Administration Expenses.
[11] TAX represents average tax rate on the accounting income before taxes of firms.
[12] EBT means Earnings before Taxes.
[13] DEPR denotes depreciation. Depreciation is not the only source of non-debt tax shields. All operating expenses are non-debt tax shield sources. However, depreciation is used as a proxy in this study.
[14] INDLEV stands for industry mean leverage.
[15] Industry mean leverages are extracted from Cophieu68 database.

Proxy	Factors	Calculation
INDCL[16]	Industry classification	= 1 if the firm belongs to regulated industries; 0 = otherwise
INDCL1	Industry classification	= 1 if the firm belongs to Petroleum, and Energy - Electricity – Gas industries; 0 = otherwise
INDCL2	Industry classification	= 1 if the firm belongs to Minerals industry; 0 = otherwise
INDCL3	Industry classification	= 1 if the firm belongs to Construction, Construction Materials, and Real Estate industries; 0 = otherwise
INDCL4	Industry classification	= 1 if the firm belongs to Manufacturing, Steel, and Plastics and Packaging industries; 0 = otherwise
INDCL5	Industry classification	= 1 if the firm belongs to Service – Tourism and Commerce industries
STOCKMRT[17]	Stock market return	Average return of VN-Index[18] Yearly Return and HNX-Index[19] Yearly Return; Yearly Return $_N$ = (Return Year $_N$ – Return Year $_{N-1}$)/Return Year $_{N-1}$
LENDRT[20]	Average lending rate	Yearly average lending rate by Vietnam's credit institutions in the market
INFLATION	Inflation rate	Yearly inflation rate of Vietnamese economy

With respect to the dummy variable INDCL, industries that have their economic activities and operations highly regulated by a number of effective laws and regulations enacted by legislative bodies, such as the National Assembly of Vietnam, are classified as regulated industries. Those that are not as strictly

[16] INDCL means industry classification.
[17] STOCKMRT denotes stock market return on Vietnam stock market.
[18] The Vietnam Stock Index or VN-Index is a capitalization-weighted index of all the companies listed on the Ho Chi Minh City Stock Exchange. The index was created with a base index value of 100 as of July 28, 2000. (Source: Bloomberg.com)
[19] Hanoi HNX Index is a capitalization-weighted price index comprising stocks traded on the Hanoi Securities Trading Center. (Source: Bloomberg.com)
[20] LENDRT denotes average lending rate.

subjected to law and regulations are categorized as unregulated industries. There are currently nine industries that can be classified under the regulated category: Real Estate with Real Estate Law No. 63/2006/QH11, Telecommunication with Telecommunication Law No. 41/2009/QH12, Energy, Electricity, and Gas with Electricity Law No. 28/2004/QH11, Petroleum with Petroleum Law 1993, Medicine, Healthcare, and Chemicals with Medicine Law No. 34/2005/QH11, Minerals with Minerals Law No. 60/2010/QH12, Food with Food Safety Law No. 55/2010/QH12, Transportation with Law on Road Traffic No. 23/2008/QH12 and Maritime Law: 40/2005/QH11, Construction with Construction Law No. 50/2014/QH13. The unregulated category includes rubber, Education, Service and Tourism, Plastics and Packaging, Manufacturing, Steel, Commerce, Aquaculture, and Construction Materials.

This study also examines the independent industry impact of some special industries on leverage. Firstly, in Vietnam, firms in the Petroleum industry and Energy, Electricity and Gas industry (dummy variable INDCL1) are highly regulated by special laws and/or are often state-owned. This may signal that these firms have a tendency to use high leverage. Secondly, according to the Vietnam Investment Review, mineral firms are highly levered due to a high level of investment in fixed assets, thus, having higher risks than others. Therefore, this study aims to test the industry difference with minerals firms (dummy variable

INDCL2). Thirdly, in 2013, the National Financial Supervisory Commission reported statistics of industries with the highest bad debt ratio, including: Construction, Construction Materials, Real Estate, Manufacturing, Steel, Plastics and Packaging, Service and Tourism, and Commerce. Also, in a study of the capital structure of real estate and construction firms, Phan Lan (2013) pointed out that said firms use significantly high leverage. In this study, these industries are grouped into three groups with dummy variables: INDCL3 for Construction, Construction Materials, and Real Estate; INDCL4 for Manufacturing, Steel, and Plastics and Packaging; and INDCL5 for Service and Tourism, and Commerce, according to how close business features are to each other.

Table 3: Predicted effects on leverage based on capital structure theories

Factors	Predicted effects on leverage				
	Trade-off theory	**Pecking -order theory**	**Agency Theory**	**Free cash flow theory**	**Market timing theory**
Business risk	–	+			
Profitability	+	–	+	+	
Firm size	+	–			
Growth opportunities	–	+	–	–	
Tangibility	+	–/+	+		
Uniqueness	–	–/+	–		
Average tax rate	+				
Non-debt tax shields	–				
Industry mean leverage					
Stock market return					–
Average lending rate	+	–	+		–
Inflation rate	+	–			+

B. SAMPLE SELECTION AND DATA COLLECTION

This research has been conducted on companies listed on two stock exchanges in Vietnam, i.e. Ho Chi Minh Stock Exchange (HOSE) and Hanoi Stock Exchange (HNX), during the five-year period from 2009 to 2010. There are 717 firms currently listed on the two stock exchanges. The sample was selected based on the following criteria: 1) Firms operating in the financial services sector, such as banks, securities companies, investment trusts, and insurance companies are excluded. These firms' liabilities are regulated according to specific financial industry regulations and should not be compared to non-financial firms; 2) Firms which are listed after 2009 are excluded due to the fact that financial statements of years before listing are often not very reliable; 3) Firms with data missing on relevant variables for any year of the period under review are excluded as this affects the process of data analysis; 4) Firms that stopped listing on the two stock exchanges in any years during the period under review are excluded; and 5) Firms with observed "outliers" – extreme and unique observations of any variables are excluded, as such values will bias the results. The sample selection results in a sample of 183 companies listed on both stock exchanges, in which 92 firms are listed on HOSE and 91 firms are listed on HNX.

The study used panel data from 183 firms during 2009-2013, resulting in 915 observations in total. Yearly financial data were collected from published

financial statements and annual reports of firms made available by many different sources including S&P Capital IQ database, company websites, and Vietnamese securities company websites such as CafeF, Vietstock, Cophieu68, and VnDirect. Published financial statements by firms are prepared according to Vietnamese Accounting Standard (VAS) and are audited mainly by the "big four" international auditing companies (KPMG, Ernst & Young, PricewaterhouseCoopers, and Deloitte). Data from 2008 and 2014 were collected for the purpose of calculating explanatory variables, i.e. profitability and business risk.

C. METHODOLOGY

This study used panel data to analyze the factors affecting the financing decisions of firms. First, descriptive statistics were used to demonstrate the features of capital structure and the financing activities of listed firms in Vietnam, as presented by the sample data. Following this, correlation analysis was conducted to derive an overview of the relationship between each pair of variables. Subsequently, linear regression was performed as the main analysis to identify the best factors to explain the capital structure decisions of Vietnamese listed firms.

There are two popular estimation methods for panel data: fixed-effects model (FEM) and random-effects model (REM). The fixed-effects model explores

the relationship between explanatory variables and dependent variables within an entity (i.e. a company in this case) and removes the effect of time-invariant characteristics pertaining to the entity in order to assess the net effect of the explanatory variables on the dependent variable. Unlike the fixed-effects model, the random-effects model assumes that the variation across entities is random and not correlated to explanatory variables in the model, allowing for time-invariant variables to have an effect on the dependent variable.

As far as industry dummy variables are considered in this study, the fixed-effects model cannot perform regression on such variables because industry dummies for each firm are time-invariant. On the other hand, the random-effects model allows the presence of dummy variables because this method assumes individual specific effects are not correlated to the independent variables. However, it is very likely that the REM encounters estimation bias with such an assumption.

Hence, the regressions were run with both the fixed-effects model (FEM) and random-effects model (REM) on only independent variables rather than industry dummies first, and the Hausman test was used to detect which model works better for the analysis. Later, Ordinary Least Square (OLS) regression was performed to assess the impact of industry classifications.

In this study, panel data regressions using both the fixed-effects model and random-effects model were conducted using Stata 11 software. To run the linear regression, data were grouped into their respective sources (the panel variable is "code") and listed according to their respective time period (the time variable is "year"). Regressions were conducted for each dependent variable, including Total Debt to Market Value of Capital (TDM), Total Debt to Book Value of Capital (TDC), Long-term Debt to Market Value of Capital (LDM), and Long-term Debt to Book Value of Capital (LDC), and thirteen independent variables (with the exclusion of six industry classification variables).

After the Hausman test specified the appropriate model (fixed or random effects) to be used, regressions with the selected method were conducted for all four leverage measures to evaluate the degree and scope of the impacts of capital structure factors on each measure and to compare similarities and differences among impacts. The overall model was assessed, and statistically significant explanatory variables were selected.

As the leverage models were generated, necessary tests were used to determine if there were regression problems such as heteroskedasticity (modified Wald test), autocorrelation (Wooldridge test), and cross-sectional dependence (Pesaran, Frees', and Friedman tests). Then, core models were derived that

overcome the identified estimation violations for each leverage measure, i.e. running regression with Driscoll-Kraay robust standard errors.

The regression model showing how the factors affecting capital structure decisions can be presented as follows:

$$\mathbf{Leverage_{it} = \alpha + \beta_1 \times F_{1\,it} + \beta_2 \times F_{2\,it} + \ldots + \beta_n \times F_{n\,it} + \varepsilon}$$

In which $Leverage_{it}$ is the leverage ratio observed for Firm i at time t; F_{it} is the factor influencing Firm i observed at time t; α is the intercept of the regression model; β is the coefficient for each explanatory variable; ε is the random statistical errors (or disturbance) of the model, representing other factors that determine capital structure but not yet covered in this study.

The pooled Ordinary Least Square (OLS) method was conducted separately to determine the industry impacts of studied industries on the capital structure of firms. The pooled OLS method generated simple linear regression models on the whole data set, ignoring the panel structure of the data. More importantly, this method allowed for the presence of industry dummy variables in the model.

CHAPTER 4: RESULTS OF THE STUDY

A. DESCRIPTIVE STATISTICS

Table 4 presents descriptive statistics of the data of 183 companies. It can be seen that, on average, non-financial firms in Vietnamese stock exchanges were highly levered. The mean leverage measured by Total Debt to Market Value of Capital ratio (TDM) is 45.93 percent, while mean Total Debt to Book Value of Capital ratio (TDC) is 36.77 percent. The mean leverage measured by Long-term Debt to Market Value of Capital ratio (LDM) measure is 14.64 percent, while mean Long-term Debt to Book Value of Capital ratio (LDC) is only 12.12 percent. This suggests that market value ratio measures higher leverage ratios than book value ratios, and that a large portion of total debt is comprised of short-term debt. The standard deviation of TDM is 27.97 percent and the standard deviation of TDC is 23.33 percent, while the standard deviation of LDM is 19.61 percent and LDC's is 16.55 percent. This indicates that the variation in the use of debt is quite large among the sampled firms, the variation among the 915 observations is larger when using market value measures of leverage compared to book value measures, and larger relative to total debt compared to only long-term debt. This can be explained by more volatile market data and larger fluctuations in the short-term borrowings of firms. The maximum value of TDM is 93.94 percent, meaning that at the maximum leverage ratio, 93.94 percent out of the total

capital of this firm is made up of debt (including short-term and long-term debt), and only 6.06 percent is equity. The maximum value of LDM is 80.21 percent, demonstrating that at the maximum leverage ratio, long-term debt accounts for 80.21 percent of capital in market value.

Table 4: Descriptive Statistics[21]

Variable	Proxy	Obs	Mean	Std. Dev.	Min	Max
Total Debt to MV of capital	**TDM**	915	0.4593	0.2797	0.0000	0.9394
Total Debt to BV of capital	**TDC**	915	0.3677	0.2333	0.0000	0.8750
LT Debt to MV of capital	**LDM**	915	0.1464	0.1961	0.0000	0.8021
LT Debt to MV of capital	**LDC**	915	0.1212	0.1655	0.0000	0.7524
Business risk	**RISK**	915	0.0290	0.0273	0.0000	0.1962
Profitability	**ROA**	915	0.0689	0.0672	-0.2000	0.3900
Firm size	**SIZE**	915	5.8206	0.5581	4.4377	7.8795
Growth opportunities	**GROWTH**	915	0.9054	0.3635	0.3269	5.5181
Capital Expenditure	**CAPEX**	915	0.0576	0.0909	0.0000	1.6008
Tangibility	**TANG**	915	0.2820	0.2153	0.0002	0.9275
Uniqueness	**SGA**	915	0.0949	0.1072	0.0052	2.3330
Average tax rate	**TAX**	915	0.1965	0.1682	0.0000	1.9318
Depreciation	**DEPR**	915	0.0337	0.0332	0.0001	0.2461
Industry mean leverage	**INDLEV**	915	0.5726	0.1222	0.3100	0.7500
Stock market return	**STOCKMRT**	915	0.0600	0.3278	-0.3800	0.5800
Average lending rate	**LENDRT**	915	0.1480	0.0299	0.1000	0.1800
Inflation rate	**INFLATION**	915	0.1000	0.0452	0.0600	0.1800
Industry classifications	Obs(INDCL) = 530		Obs(INDCL1) = 85		Obs(INDCL2) = 25	
	Obs(INDCL3) = 290		Obs(INDCL4) = 150		Obs(INDCL5) = 65	

[21] Observed outliers are omitted for all variables

Table 5 summarizes the mean values of all leverage ratios and capital structure factors by taking the average of 183 firms in each year to see the change in these measures during the five-year period.

Table 5: Means of variables

Variable	Proxy	2009	2010	2011	2012	2013
Total Debt to MV of capital	**TDM**	0.3683	0.4108	0.5434	0.5167	0.4574
Total Debt to BV of capital	**TDC**	0.3481	0.3607	0.3771	0.3815	0.3711
LT Debt to MV of capital	**LDM**	0.1444	0.1530	0.1669	0.1464	0.1214
LT Debt to MV of capital	**LDC**	0.1388	0.1343	0.1208	0.1130	0.0992
Business risk	**RISK**	0.0244	0.0369	0.0358	0.0307	0.0172
Profitability	**ROA**	0.0842	0.0785	0.0764	0.0536	0.0515
Firm size	**SIZE**	5.7240	5.8003	5.8488	5.8588	5.8710
Growth opportunities	**GROWTH**	1.0377	0.9332	0.7783	0.8328	0.9449
Capital Expenditure	**CAPEX**	0.0764	0.0656	0.0588	0.0395	0.0479
Tangibility	**TANG**	0.2956	0.2909	0.2757	0.2778	0.2700
Uniqueness	**SGA**	0.0853	0.0871	0.0942	0.1062	0.1016
Average tax rate	**TAX**	0.1687	0.2011	0.2114	0.1915	0.2099
Depreciation	**DEPR**	0.0343	0.0326	0.0330	0.0344	0.0340
Industry mean leverage	**INDLEV**	0.5635	0.5608	0.5833	0.5793	0.5760
Stock market return	**STOCKMRT**	0.5839	-0.1707	-0.3801	0.0743	0.2040
Average lending rate	**LENDRT**	0.1001	0.1437	0.1801	0.1775	0.1369
Inflation rate	**INFLATION**	0.0688	0.1175	0.1813	0.0681	0.0604

It is recognized that total debt ratios including TDM and TDC were in a rising trend in the first three years, but in a declining trend in the later years. During the period from 2011 to 2013, firms became more levered than the previous two years in terms of market value, and less levered in terms of book value. Average TDC in 2011 was 37.71 percent, approximately 3 percent higher

than it was in 2009. Average TDM in 2011 was 54.34 percent, approximately 18 percent higher than it was in 2009. This figure reduced to 45.74 percent in 2013, yet this can still be seen as a high level. The reason for the sharper increase in TDM than TDC might be due to the down-trend of the stock market, which leads to lower market value of capital. With regard to long-term debt ratios, LDM and LDC have decreasing trends as the data moves towards 2013 – as average LDM was 14.44 percent in 2009 and 12.14 percent in 2013, and LDC was 13.88 percent in 2009 and 9.92 percent in 2013. The overall decreasing trends of LDM and LDC can be explained by an increase in the short-term borrowings proportion of debt. Combining the upward total debt ratios and downward long-term ratios, it can be seen that firms have increased in leverage recently, especially with regard to short-term debt. In order to minimize credit risk, banks have had a tendency to prefer making short-term loans rather than long-term loans during the economic downturn in Vietnam. Consequently, firms face less difficulty when borrowing in the short-term rather than the long-term.

Business risk (RISK), as measured by the standard deviation of yearly ROA, has fluctuated significantly during the five year period. At the peak of the recession, in 2010 and 2011, firms faced more volatile revenues and earnings. During this period, RISK reached the highest levels of 3.69 percent and 3.58 percent respectively. These levels reduced to 1.72 percent in 2013 when the

economy was on its way to recovery. This indicates that the average level of business risk varied across time because a firm's ability to generate earnings changed over time and along with economic cycles.

Profitability has been in a clear downward trend as average ROA has reduced from 8.42 percent in 2009 to 5.15 percent in 2013. Such a decrease in profitability could reflect the lasting negative impact of the 2008 – 2011 recession on the business performance of firms. Also, the decrease in ROA could be explained in part by the growth in firm size (SIZE), measured by Log(Total Assets), which increased from 5.72 in 2009 to 5.87 in 2013, making ROA smaller. (See Table 5)

The average value of growth opportunities (GROWTH), measured by market value to book value of assets, was generally less than 1, except in the year 2009, indicating that the market perceived a low growth prospect for firms. On average, Vietnamese listed firms have made less new capital expenditure per unit of asset, as can be seen from a decreased CAPEX from 7.64 percent in 2009 to 4.79 percent in 2013, another signal of limited growth opportunities.

Tangibility (TANG), measured by net property, plant and equipment, has fluctuated slightly on average during the five years. The proportion of long-term tangible assets to total assets decreased to 27.57 percent in 2011 from the highest value of 29.56 percent in 2009, and has been maintained at that same

level. This suggests that the tangibility of assets did not change greatly over time. Meanwhile, the ratio of selling, general & administration (SGA) expenses to net sales increased from 8.53 percent in 2009 to 10.16 percent in 2013, meaning that firms have increased spending on SGA expenses that could possibly be wasted on organizational inefficiencies or invested in more intangible assets.

In general, average tax rate (TAX) calculated for the sampled firms on average was kept within an increasing trend from 16.87 percent in 2009 to 20.99 percent in 2013. This shows that firms have faced a tougher environment with higher tax expenses, despite government efforts toward tax support. Meanwhile, depreciation (DEPR), as a proxy for non-debt tax shields and measured by depreciation expense divided by total assets, only experienced slight fluctuation on average across the five years. While average tax rate increased and non-debt tax shields stayed the same, firms valued the benefit from debt tax shields more.

The mean industry leverage is 57.01 percent, with the highest industry leverage at 75.00 percent (Construction industry in 2013) and the lowest at 31.00 percent (Food industry in 2009). The lowest and highest average values of industry leverage in the five years are 56.08 percent (in 2010) to 58.33 percent (in 2011), relatively higher than the mean leverage ratios calculated for firms in this study. This is due to different calculation methods and the fact that industry mean leverage (INDLEV) of each year is based on the composition of stocks in

eighteen different industries, while our leverage measures (TDM, TDC) are based on the average of 183 firms in the sample. However, TDM is likely to move in the same direction with INDLEV, as they all increased in 2011 and subsequently experienced a slight decrease in the two later years. (See Table 5)

On average, stock market return (STOCKMRT), as a proxy for stock market condition, has large variation across the years, with the lowest rate of -38.01 percent in 2011 and the highest rate of 58.39 percent in 2009, with standard deviation of 32.78 percent. This reflects a highly volatile stock market condition in Vietnam. Average lending rate in the market, as the proxy for debt market condition, ranges from 10.00 percent to 18.00 percent. When inflation, as a proxy for macroeconomics condition, reached the highest rate in 2011, the lending rate also increased to the highest level. Both inflation and lending rate are in a decreasing trend from 2011 to 2013. (See Table 5)

B. CORRELATION TEST RESULTS

Table 6 presents the correlation matrix of leverage ratios and factors, showing how each pair of variables moves in relation to each other. From this table, the direction that any two variables vary together, the strength of correlation (correlation coefficient, denoted by r), and the level of statistical significance can be interpreted. The stars denote the correlation that is statistically significant at significance level $\alpha = 0.01$, $\alpha = 0.05$, or $\alpha = 0.1$.

The correlation between Total Debt to Market Value of Capital (TDM) and Total Debt to Book Value of Capital (TDC) and that between Long-term Debt to Market Value of Capital (LDM) and Long-term Debt to Book Value of Capital (LDC) are very high, with the correlation coefficients (r) of 91 percent and 96 percent, respectively. This means market value and book value of capital are highly correlated and fairly consistent in measuring leverage.

Business risk (RISK), as measured by the standard deviation of ROA, has a negative relation to all four leverage ratios and these correlations are statistically significant. However, the correlation coefficients for these relationships are quite low (from 6% with LDC to -13% with TDM). This relationship is supported by trade-off theory, which states that firms borrow less when business risk increases due to higher expected costs of financial distress. Further, business risk is also correlated with other factors such as profitability (ROA), firm size (SIZE), average tax rate (TAX), industry mean leverage (INDLEV), stock market return (STOCKMRT), average lending rate (LENDRT), and inflation rate (INFLATION), as demonstrated in Table 6.

Profitability (ROA) is negatively correlated with all four leverage ratios and all these relationships are significant at $\alpha = 0.01$. This suggests that profitability is likely to have an inverse influence on debt ratios, matching the predicted sign made by pecking order theory (See Table 3). The correlation coefficient of ROA

with TDM is -0.30, showing a moderate correlation. Profitability is also correlated with other factors such as growth opportunities, tangibility, uniqueness, average tax rate, depreciation, industry mean leverage, lending rate, inflation rate. Most of the correlation coefficients are small, except for growth opportunities (r = 0.36). This suggests that the profitability and growth opportunities of a firm could move in the same direction.

Firm size (SIZE), measured by log of total assets, is positively correlated with all four leverage ratios and these relationships are statistically significant at $\alpha = 0.01$. This implies that firm size is likely to positively affect the level of debt that firms use in financing decisions. The correlation coefficient r of SIZE with TDM, TDC, LDM, and LDC are 28 percent, 38 percent, 37 percent, and 42 percent respectively, indicating moderate correlations. This result is consistent with trade-off theory that larger firms are more stable with low business risk, so they have higher leverage than that of small firms, but it contradicts agency and pecking order theories that suggest larger firms have a lower degree of information asymmetry and more retained cash, causing them to use less debt.

Growth opportunities (GROWTH), measured by market to book value of assets, is negatively related to TDM, TDC, LDM but mostly with a weak correlation – except for a moderate correlation with TDM. These negative relationships match the direction predicted by trade-off theory and agency theory that firms

having more growth opportunities have higher expected costs of financial distress and bear more agency costs, so they prefer equity financing and reduce leverage. Meanwhile, CAPEX, another measure of growth opportunities, is positively correlated with all four ratios. This supports the idea that firms which spend more on growth opportunities, (i.e. investing more in capital expenditure), need more funds and prefer debt to external equity, as established by pecking order theory.

Correlation results of tangibility of assets (TANG) show that this factor positively varies with four debt ratios at a high level of significance. Tangibility of assets has moderate relationships with total leverage ratios (r = 16% and 19% with TDM and TDC respectively) but strong relationships with long-term leverage ratios (r = 56% with both LDM and LDC). It can be predicted that tangibility is a potential factor affecting leverage, especially long-term borrowing. Evidence of this positive impact is supported by most theories, including trade-off theory, pecking order theory, and agency theory. Firms having more tangible assets can borrow more easily on the market, as they have lower costs of financial distress and fewer debt-related agency problems, thus having higher leverage. On the other hand, SGA, a proxy for uniqueness of assets, shows negative correlations with debt ratios but with very small correlation coefficients. As suggested by trade-off theory, the more unique the firm's assets are, the higher the cost of financial distress should be.

Table 6: Correlation Matrix[22]

	TDM	TDC	LDM	LDC	RISK	ROA	SIZE	GROWTH
TDM	1.00							
TDC	0.91***	1.00						
LDM	0.53***	0.53***	1.00					
LDC	0.48***	0.57***	0.96***	1.00				
RISK	-0.13***	-0.10***	-0.08*	-0.06*	1.00			
ROA	-0.30***	-0.20***	-0.15***	-0.13***	0.21***	1.00		
SIZE	0.28***	0.38***	0.37***	0.42***	-0.11***	0.002	1.00	
GROWTH	-0.22***	-0.01	-0.07**	0.03	0.01	0.36***	0.20***	1.00
CAPEX	0.03	0.08*	0.22***	0.24***	0.02	0.07**	0.02	0.10***
TANG	0.16***	0.19***	0.56***	0.56***	0.03	0.07**	0.14***	-0.0004
SGA	-0.15***	-0.16***	-0.04	-0.03	0.01	-0.14***	-0.04	0.03
TAX	0.06*	0.05	0.02	0.02	-0.14***	-0.15***	0.09***	-0.02
DEPR	0.15***	0.15***	0.40***	0.37***	0.03	0.21***	0.03	-0.0001
INDLEV	0.37***	0.31***	0.17***	0.16***	-0.09***	-0.28***	0.03	-0.07**
INDCL	-0.05*	-0.03	0.17***	0.18***	-0.07**	-0.06*	0.21***	0.09***
INDCL1	-0.01	0.02	0.16***	0.17***	0.01	0.02	0.30***	-0.03
INDCL2	0.11***	0.11***	0.27***	0.25***	0.06*	0.15***	0.03	0.07**
INDCL3	0.24***	0.20***	0.09***	0.09***	-0.06*	-0.20***	-0.02	-0.01
INDCL4	0.08**	0.07**	-0.15***	-0.15***	0.002	0.06*	-0.07*	-0.02
INDCL5	-0.06*	-0.08**	-0.10***	-0.11***	-0.05	-0.14***	-0.05	-0.04
STOCKMRT	-0.16***	-0.03	-0.05	0.01	-0.20***	-0.002	-0.06*	0.21***
LENDRT	0.22***	0.05	0.03	-0.04	0.13***	-0.09***	0.08**	-0.24***
INFLATION	0.11***	0.01	0.05*	0.02	-0.20***	0.10***	0.01	-0.16***

	CAPEX	TANG	SGA	TAX	DEPR	INDLEV	INDCL	INDCL1
CAPEX	1.00							
TANG	0.35***	1.00						
SGA	-0.04	-0.05	1.00					
TAX	0.03	-0.06*	-0.03	1.00				
DEPR	0.22***	0.58***	-0.07**	-0.06*	1.00			
INDLEV	0.02	-0.07**	-0.05	0.14***	-0.08**	1.00		
INDCL	0.002	0.02	0.06*	0.02	0.14***	0.05	1.00	
INDCL1	-0.02	0.13***	-0.09***	-0.01	0.07**	-0.09***	0.26***	1.00
INDCL2	0.15***	0.20***	-0.002	-0.04	0.60***	0.03	0.14***	-0.05
INDCL3	-0.03	-0.14***	0.02	0.12***	-0.20***	0.74***	0.10***	-0.22***
INDCL4	-0.05	-0.13***	-0.05	-0.07**	-0.07**	-0.25***	-0.52***	-0.14***
INDCL5	-0.01	-0.06*	0.03	0.08**	-0.14***	-0.07**	-0.32***	-0.09***
STOCKMRT	0.04	0.02	0.01	-0.07**	0.02	-0.03	-0.00	0.00
LENDRT	-0.10***	-0.03	0.05	0.06	-0.005	0.06*	0.00	-0.00
INFLATION	0.03	-0.003	-0.02	0.05	-0.02	0.02	-0.00	-0.00

	INDCL2	INDCL3	INDCL4	INDCL5	STOCKMRT	LENDRT	INFLATON
INDCL2	1.00						
INDCL3	-0.11***	1.00					
INDCL4	-0.07**	-0.30***	1.00				
INDCL5	-0.05	-0.20***	-0.12***	1.00			
STOCKMRT	0.00	-0.00	0.00	-0.00	1.00		
LENDRT	0.00	-0.00	-0.00	0.00	-0.78***	1.00	
INFLATION	0.00	0.00	0.00	-0.00	-0.83***	0.47***	1.00

[22] ***Significant at 0.01; **Significant at 0.05; *Significant at 0.1

Tax expense (TAXEXP) does not have a statistically significant relationship with leverage measures, except for a weak correlation with Total Debt to Market Value of Capital (TDM). This indicates that when taxes increase, Vietnamese listed firms do not necessarily borrow more to benefit from the debt-tax shields, as suggested by trade-off theory. On the other hand, the ratio of depreciation expense to total assets (DEPR), as a proxy for non-debt tax shields, is positively correlated to all four leverage measures at 0.01 significance level. The relationship is, however, fairly weak with TDM (r = 15%) and TDC (r = 15%), but moderate with LDM (r = 40%) and LDC (r = 37%). This result does not agree with the negative direction that trade-off theory would suggest.

Industry mean leverage (INDLEV) and debt ratios vary together in the same direction. In Table 3, correlation coefficients of INDLEV with four debt ratios are all positive and these relationships are significant at 0.01. The correlation of INDLEV and TDM is moderate (r = 37%). This could infer that firm leverage follows industry median leverage, as supported by previous empirical findings.

The correlation matrix indicates that stock market return (STOCKMRT), as a proxy for stock market condition, is negatively related to Total Debt to Market Value of Capital (TDM), while it does not have any significant relation to other debt ratios. In addition, average lending rate (LENDRT) and inflation rate (INFLATION) both have a positive correlation with TDM. Besides TDM, Inflation

rate is also positively correlated to Long-term Debt to Market Value of Capital (LDM). Such results show that market conditions and macroeconomic conditions are likely to affect firm leverage, according to the market timing theory.

Industry classification represents many variables that affect capital structure, (i.e. six industry dummies in this study for different industry groups). Most of the industry dummy variables are showing weak to moderate correlation with leverage ratios at 0.01 or 0.05 significance level. Whether the industry is highly regulated or not, as represented by INDCL, makes a difference in LDM and LDC (r = 0.17 and 0.18, relatively); and whether or not a firm belongs to the examined industries, including Petroleum, and Energy, Electricity, and Gas; Minerals; Construction, Construction Materials, and Real Estate; Manufacturing, Steel, and Plastics and Packaging; Service and Tourism and Commerce industries, has moderate correlation on firm leverage ratios (i.e. the correlation coefficient between INDCL2 and LDM = 0.27). These results show evidence that capital structure is possibly affected by industry classifications, or firms belonging to specified groups have higher leverage.

C. REGRESSION RESULTS

This study presents analysis of determinants of capital structure using four leverage measures as proposed in the previous sections to clarify if the relationships between the factors and leverage truly exist and in which specific directions.

Table 7 shows regression results based on the fixed-effects model for each of the four leverage measures, including regression coefficients for each explanatory variable, their corresponding t-value, level of statistical significance of the coefficient, and within R^2 value for each regression model. All FEM models presented in Table 7 are statistically significant with Prob > F = 0.000.

Table 8 demonstrates regression results based on the random-effects model for each of the four leverage measures, including regression coefficients for each explanatory variable, their corresponding z-value, level of statistical significance of the coefficient, and overall R^2 value for each regression model. All REM models presented in Table 8 are statistically significant with Prob > chi2 = 0.000.

Table 7: Fixed-effects regression results

	TDM	TDC	LDM	LDC
RISK	-0.3040	0.2962*	0.4435***	0.4798***
	(-1.32)	(1.69)	(2.87)	(3.92)
ROA	-0.7047***	-0.4763***	-0.1038	-0.0534
	(-6.02)	(-5.34)	(-1.32)	(-0.86)
SIZE	0.4865***	0.4589***	0.1321***	0.1057***
	(8.90)	(11.01)	(3.60)	(3.64)
GROWTH	-0.1457***	-0.0201	-0.0522***	-0.0151
	(-8.31)	(-1.50)	(-4.44)	(-1.62)
CAPEX	0.0438	0.0678	0.0767**	0.0848***
	(0.77)	(1.57)	(2.01)	(2.82)
TANG	0.1407**	0.1537***	0.2978***	0.2652***
	(2.23)	(3.19)	(7.02)	(7.91)
SGA	0.0009	0.0553	0.1594***	0.1613***
	(0.02)	(1.36)	(4.47)	(5.72)
TAX	-0.0395	-0.0193	-0.0220	-0.0155
	(-1.36)	(-0.88)	(-1.13)	(-1.01)
DEPR	0.3730	-0.1171	0.1703	-0.2463
	(0.88)	(-0.36)	(0.60)	(-1.10)
INDLEV	0.2315	0.2118*	1.060	0.1506*
	(1.56)	(1.88)	(1.07)	(1.92)
STOCKMRT	0.1539***	0.0591**	0.0407*	0.0259
	(4.31)	(2.17)	(1.70)	(1.37)
LENDRT	1.3964***	-0.2882	-0.1539	-0.4669***
	(5.40)	(-1.46)	(-0.89)	(-3.40)
INFLATION	1.0352***	0.4370***	0.4523***	0.2942***
	(5.37)	(2.98)	(3.5)	(2.88)
_cons	-2.6825***	-2.4313***	-0.7716***	-0.6222***
	(-8.40)	(-9.99)	(-3.60)	(-3.67)
R-sq - within[23]	0.4066	0.2406	0.1779	0.2048
Prob > F	0.0000	0.0000	0.0000	0.0000

***Significant at 0.01
**Significant at 0.05
*Significant at 0.1

[23] In fixed-effects model, the R-square to concern is Within R-square, because it estimates the within-subject (within-group) variance by computing the differences between observed values and their means.

Table 8: Random-effects regression results

	TDM	TDC	LDM	LDC
RISK	-0.4239**	0.1786	0.3214**	0.4022***
	(-1.88)	(1.02)	(2.17)	(3.39)
ROA	-0.7573***	-0.5195***	-0.1755**	-0.1128**
	(-6.78)	(-5.95)	(-2.40)	(-1.92)
SIZE	0.1980***	0.2190***	0.1195***	0.1120***
	(8.21)	(10.39)	(7.99)	(8.94)
GROWTH	-0.1424***	-0.0186	-0.0551***	-0.0173**
	(-8.25)	(-1.39)	(-4.84)	(1.91)
CAPEX	0.0666	0.0900**	0.0812**	0.0886***
	(1.17)	(2.05)	(2.16)	(2.97)
TANG	0.1185**	0.1369***	0.3493***	0.3046***
	(2.26)	(3.24)	(10.36)	(11.12)
SGA	-0.0649	0.0084	0.1277***	0.1365***
	(-1.24)	(0.21)	(3.71)	(4.97)
TAX	-0.0397	-0.0180	-0.0231	-0.0167
	(-1.36)	(-0.80)	(-1.19)	(-1.08)
DEPR	0.7086**	0.1787	0.6554***	0.2228
	(2.10)	(0.65)	(3.03)	(1.26)
INDLEV	0.5569***	0.4213***	0.2373***	0.2133***
	(5.78)	(5.20)	(3.90)	(4.24)
STOCKMRT	0.1069***	0.0216	0.0335	0.0234
	(2.98)	(0.78)	(1.41)	(1.24)
LENDRT	1.5737***	-0.1203	-0.2137***	-0.5172***
	(6.12)	(-0.61)	(-1.26)	(-3.83)
INFLATION	0.7505***	0.2069***	0.4496***	0.3111***
	(3.92)	(1.40)	(3.55)	(3.09)
_cons	-1.1799***	-1.1522	-0.7804***	-0.7054***
	(-7.65)	(-8.69)	(8.08)	(-8.78)
R-sq - overall[24]	0.3392	0.2638	0.4742	0.4762
Prob > chi2	0.0000	0.0000	0.0000	0.0000

***Significant at 0.01
**Significant at 0.05
*Significant at 0.1

[24] In random-effects model, the R-square to concern is Overall R-square.

Next, the Hausman test helps specify which of the above two methods, fixed-effects model (FEM) and random-effects model (REM), works better for the data set being studied. Results show that Prob>chi2 = 0.0000. This means that the Hausman test rejects the null hypothesis in all four cases. There is strong evidence that the fixed-effects model is the suitable method for the regression model of all four leverage ratios.

Ho: difference in coefficients not systematic

Table 9: Hausman test results

	TDM	**TDC**	**LDM**	**LDC**
Chi2	58.55	70.23	54.20	97.33
Prob > Chi2	0.0000	0.0000	0.0000	0.0000
Conclusion	Reject Ho	Reject Ho	Reject Ho	Reject Ho
Selected model	FEM	FEM	FEM	FEM

To deliver better regressions with the fixed-effects model, the explanatory variables that are not statistically significant are removed from the above models. Fixed-effects regressions with four dependent variables, Total Debt to Market Value of Capital (TDM), Total Debt to Book Value of Capital (TDC), Long-term Debt to Market Value of Capital (LDM), and Long-term Debt to Book Value of Capital (LDC) are conducted again for the respective sets of selected statistically significant explanatory variables. Table 10 summarizes the regression results.

Table 10: Fixed-effects regression with selected factors

	TDM (1)	TDC (2)	LDM (3)	LDC (4)
RISK		0.3067*	0.4127***	0.4572***
		(1.75)	(2.70)	(3.78)
ROA	-0.7432***	-0.5055***		
	(-6.62)	(-5.87)		
SIZE	0.4976***	0.4481***	0.1327***	0.0977***
	(9.30)	(11.01)	(3.79)	(3.47)
GROWTH	-0.1450***		-0.0528***	
	(-8.30)		(-4.62)	
CAPEX			0.0733**	0.0874***
			(1.96)	(2.95)
TANG	0.1567***	0.1593***	0.3076***	0.2572***
	(2.65)	(3.55)	(7.43)	(7.86)
SGA			0.1748***	0.1701***
			(5.04)	(6.19)
TAX				
DEPR				
INDLEV		0.1889*		0.1733**
		(1.71)		(2.24)
STOCKMRT	0.1699***	0.0876***	0.0525***	
	(4.84)	(4.44)	(3.02)	
LENDRT	1.4730***			-0.5456***
	(5.83)			(-5.63)
INFLATION	1.0786***	0.5484***	0.4635***	0.1781***
	(5.68)	(4.04)	(3.98)	(3.18)
_cons	-2.6350***	-2.4275***	-0.7471***	-0.5906***
	(-8.42)	(-10.10)	(-3.56)	(-3.73)
R-sq - within	0.4009	0.2307	0.1723	0.1961
Prob > F	0.0000	0.0000	0.0000	0.0000

***Significant at 0.01
**Significant at 0.05
*Significant at 0.1

To detect typical estimation issues in the models (1), (2), (3), and (4) above, the next analysis employs suitable statistical tests for fixed-effects regression.

Test for heteroskedasticity

This study uses the modified Wald test (Greene, 2000) for groupwise heteroskedasticity, following the regression models above. This test helps detect whether the errors are uncorrelated and normally distributed, and that their variances are constant and do not vary with the effects modelled.

H0: sigma(i)^2 = sigma^2 for all i

Table 11: Modified Wald test results for heteroskedasticity

	TDM (1)	**TDC (2)**	**LDM (3)**	**LDC (4)**
chi2 (183)	27538.24	240000	190000	190000
Prob > chi2	0.0000	0.0000	0.0000	0.0000

The p-value is 0.0000 in four cases, suggesting that the modified Wald test strongly rejects the null hypothesis in favor of the alternative hypothesis. In other words, there is strong evidence for the existence of heteroskedasticity in the estimation. The presence of such heteroskedasticity can invalidate the significance of the statistical model. This study deals with this violation, as discussed below, by deriving robust standard errors for the estimation.

Test for autocorrelation

This study uses the Wooldridge test for autocorrelation (Wooldridge, 2002) following the fixed-effects regression results above. This study assumes that there

is no correlation between a time-series with its own past and future values; this test determines if such a correlation exists.

H0: no first order autocorrelation

Table 12: Wooldridge test results for autocorrelation

	TDM (1)	TDC (2)	LDM (3)	LDC (4)
F (1,182)	204.890	181.982	97.176	36.996
Prob > F	0.0000	0.0000	0.0000	0.0000

Since p-value equals 0.0000, the Wooldridge test rejects the null hypothesis of no autocorrelation, meaning that there is strong evidence for the existence of an autocorrelation issue in the regression models. This study deals with this violation, as mentioned below, by running the regressions with Driscoll-Kraay standard errors.

Test for cross-sectional dependence

Because the panel data set used in this research is composed of many cross-sectional units and few time-series observations, it may suffer from cross-sectional dependence. To test the presence of a cross-sectional dependence issue, this study employs three methods: Pesaran by Pesaran (2004), Frees' by Frees (1995, 2004), and Friedman (1937). The results are shown below.

1) Pesaran test

Table 13: Pesaran test results for cross-sectional independence

	TDM (1)	TDC (2)	LDM (3)	LDC (4)
Pesaran's test of cross sectional independence	-1.393	5.656	13.172	15.805
Pr	1.8364	0.0000	0.0000	0.0000
Average absolute value of the off-diagonal elements	0.509	0.496	0.474	0.470

Since p-values are large for the TDM model, there is not enough evidence to reject the null hypothesis of no cross-sectional dependence for the TDM model, meaning that there is possibly a cross-sectional dependence estimation issue. On the other hand, test results for TDC, LDM, and LDC models show evidence of the existence of cross-sectional independence (p-value = 0.0000).

2) Frees' test

Table 14: Frees' test results for cross-sectional independence

	TDM (1)	TDC (2)	LDM (3)	LDC (4)
Frees' test of cross-sectional independence	15.142	9.196	8.512	9.878
Critical values from Frees' Q distribution:				
alpha = 0.10:	0.4892			
alpha = 0.05 :	0.6860			
alpha = 0.01 :	1.1046			

Since Frees' statistics for four models are larger than critical value at the smallest significance level 0.01, the tests reject the null hypothesis. There is strong evidence that cross-sectional dependence exists in the estimations.

3) Friedman's test

Table 15: Friedman's test results for cross-sectional independence

	TDM (1)	TDC (2)	LDM (3)	LDC (4)
Friedman's test of cross sectional independence	1.915	20.463	34.330	42.417
Pr	1.0000	1.0000	1.0000	1.0000

Since Friedman's p-value is large for all tests, there is not enough evidence to reject the null hypothesis of cross-sectional independence.

Because at least two out of three tests provide strong evidence for the presence of cross-sectional dependence, it can be concluded that the panel models have a cross-sectional dependence issue. This study deals with the violation in estimation as follows:

Dealing with the violations

The Driscoll and Kraay (1998) standard errors for coefficients are calculated to avoid estimation biases caused by heteroskedasticity, autocorrelation, and cross-sectional dependence. This technique works for the data used in this study because the size of the cross-sectional dimension does not affect the feasibility, even if the number of panels (factors) is much larger than the number of time series (years) (Driscoll and Kraay, 1998). The following are results of regression models for the respective leverage measures.

Table 16: TDM fixed-effects regression with Driscoll-Kraay standard errors

Regression with Driscoll-Kraay standard errors				Number of obs = 915		
Method: Fixed-effects regression				Number of groups = 183		
Group variable (i): code				F(7, 182) = 889.73		
Maximum lag: 2				Prob > F = 0.0000		
Within R-squared = 0.4009						
TDM	**Coef.**	**Drisc/Kraay Std. Err.**	**T**	**P>t**	**[95% Conf. Interval]**	
ROA	-0.7432***	0.1014	-7.33	0.0000	-0.9433	-0.5431
SIZE	0.4976***	0.0609	8.18	0.0000	0.3775	0.6177
GROWTH	-0.1450***	0.0144	-10.05	0.0000	-0.1734	-0.1165
TANG	0.1567***	0.0530	2.95	0.0040	0.0520	0.2613
STOCKMRT	0.1699***	0.0117	14.47	0.0000	0.1467	0.1931
LENDRT	1.4730***	0.0416	35.37	0.0000	1.3908	1.5552
INFLATION	1.0786***	0.1024	10.54	0.0000	0.8766	1.2806
_cons	-2.6350***	0.3786	-6.96	0.0000	-3.3820	-1.8880

Table 17: TDC fixed-effect regression with Driscoll-Kraay standard errors

Regression with Driscoll-Kraay standard errors				Number of obs = 915		
Method: Fixed-effects regression				Number of groups = 183		
Group variable (i): code				F(7, 182) = 115.08		
Maximum lag: 2				Prob > F = 0.0000		
within R-squared = 0.2307						
TDC	**Coef.**	**Drisc/Kraay Std. Err.**	**T**	**P>t**	**[95% Conf. Interval]**	
RISK	0.3067**	0.1284	2.39	0.0180	0.0533	0.5602
ROA	-0.5055***	0.0798	-6.34	0.0000	-0.6628	-0.3481
SIZE	0.4481***	0.0659	6.80	0.0000	0.3181	0.5781
TANG	0.1593**	0.0719	2.22	0.0280	0.0175	0.3012
INDLEV	0.1889***	0.0680	2.78	0.0060	0.0548	0.3230
STOCKMRT	0.0876***	0.0235	3.72	0.0000	0.0411	0.1340
INFLATION	0.5484***	0.1751	3.13	0.0020	0.2028	0.8939
_cons	-2.4275***	0.3836	-6.33	0.0000	-3.1844	-1.6707

Table 18: LDM fixed-effect regression with Driscoll-Kraay standard errors

Regression with Driscoll-Kraay standard errors	Number of obs = 915
Method: Fixed-effects regression	Number of groups = 183
Group variable (i): code	F(8, 182) = 157.95
Maximum lag: 2	Prob > F = 0.0000
within R-squared = 0.1723	

LDM	Coef.	Drisc/Kraay Std. Err.	T	P>t	[95% Conf.	Interval]
RISK	0.4127***	0.1007	4.10	0.0000	0.2140	0.6115
SIZE	0.1327***	0.0275	4.82	0.0000	0.0784	0.1870
GROWTH	-0.0528***	0.0065	-8.14	0.0000	-0.0656	-0.0400
CAPEX	0.0733***	0.0179	4.09	0.0000	0.0379	0.1087
TANG	0.3076***	0.0579	5.32	0.0000	0.1934	0.4218
SGA	0.1748***	0.0178	9.83	0.0000	0.1397	0.2099
STOCKMRT	0.0525***	0.0100	5.25	0.0000	0.0328	0.0722
INFLATION	0.4635***	0.0826	5.61	0.0000	0.3004	0.6265
_cons	-0.7471***	0.1866	-4.00	0.0000	-1.1153	-0.3789

Table 19: LDC fixed-effect regression with Driscoll-Kraay standard errors

Regression with Driscoll-Kraay standard errors			Number of obs = 915			
Method: Fixed-effects regression			Number of groups = 183			
Group variable (i): code			F(8, 182) = 208.19			
Maximum lag: 2			Prob > F = 0.0000			
within R-squared = 0.1961						
LDC	**Coef.**	**Drisc/Kraay Std. Err.**	**T**	**P>t**	**[95% Conf.**	**Interval]**
RISK	0.4572***	0.1216	3.76	0.0000	0.2173	0.6972
SIZE	0.0977***	0.0096	10.18	0.0000	0.0788	0.1166
CAPEX	0.0874***	0.0234	3.73	0.0000	0.0412	0.1336
TANG	0.2572***	0.0639	4.03	0.0000	0.1311	0.3832
SGA	0.1701***	0.0087	19.61	0.0000	0.1530	0.1872
INDLEV	0.1733***	0.0302	5.74	0.0000	0.1137	0.2328
LENDRT	-0.5456***	0.1195	-4.56	0.0000	-0.7814	-0.3098
INFLATION	0.1781***	0.0552	3.23	0.0010	0.0692	0.2870
_cons	-0.5906***	0.0690	-8.56	0.0000	-0.7268	-0.4544

*** Significant at 0.01
** Significant at 0.05
Lag length of m(T)= floor[4(T/100)^(2/9)] = 2 with T=5

The fixed-effect regressions with Driscoll-Kraay standard errors provide the same coefficients but different standard errors, absolute values of critical value (t), and confidence interval of each variable, in comparison to the results in Table 10 above. This regression can provide a more reliable estimation that overcomes the detected issues. A summary of the four leverage models is given below.

(1) The TDM model

The within R-squared of the TDM model is 0.4009, meaning that selected factors, profitability (ROA), firm size (SIZE), growth opportunities (GROWTH),

tangibility (TANG), stock market return (STOCKMRT), average lending rate (LENDRT) and inflation rate (INFLATION) can explain 40.09 percent of the variability of leverage, as measured by Total Debt to Market value of Capital. (See Table 16)

(2) The TDC model

The within R-squared of the TDC model is 0.2307, meaning that selected factors business risk (RISK), profitability (ROA), firm size (SIZE), tangibility (TANG), industry leverage (INDLEV), stock market return (STOCKMRT), inflation rate (INFLATION) can explain 23.07% percent of the variability of leverage, as measured by Total Debt to Book value of Capital. (See Table 17)

(3) The LDM model

The within R-squared of the LDM model is 0.1723, meaning that selected factors, including business risk (RISK), firm size (SIZE), growth opportunities (GROWTH), capital expenditure (CAPEX), tangibility (TANG), uniqueness (SGA), stock market return (STOCKMRT), inflation rate (INFLATION) can explain 17.23 percent of the variability of leverage, as measured by Long-term Debt to Market value of Capital. (See Table 18)

(4) The LDC model

The within R-squared of the LDC model is 0.1961, meaning that selected factors business risk (RISK), firm size (SIZE), capital expenditure (CAPEX),

tangibility (TANG), uniqueness (SGA), industry leverage (INDLEV), average lending rate (LENDRT), inflation rate (INFLATION) can explain 19.61 percent of the variability of leverage as measured by Long-term Debt to Book value of Capital. (See Table 19)

To evaluate how firm leverage is influenced by industry classifications measured by dummy variables INDCL (regulated or unregulated), INDCL1 (Petroleum, and Energy, Electricity, and Gas industries), INDCL2 (Minerals industry), INDCL3 (Construction, Construction Materials, and Real Estate industries), INDCL4 (Manufacturing, Steel, and Plastics and Packaging industries), INDCL5 (Service and Tourism, and Commerce industries), the Ordinary Least Squares (OLS) method is performed on the data to detect the industry effects.

Table 20 shows that INDCL (regulated or unregulated), INDCL2 (Minerals industry), and INDCL3 (Construction, Construction Materials, and Real Estate industries) are found to have statistically significant influence on leverage ratios, while INDCL1 (Petroleum, and Energy, Electricity, and Gas industries) and INDCL4 (Manufacturing, Steel, and Plastics and Packaging industries) are revealed to have no significant influence on capital structure.

Table 20: OLS regression results with industry dummies

	TDM	TDC	LDM	LDC
RISK	-0.6135	-0.1705	-0.2242	-0.0153
ROA	-1.0079	-0.7875	-0.4959	-0.4459
SIZE	0.1522	0.1594	0.1025	0.1002
GROWTH	-0.0945	0.0270	-0.0429	-0.0029
CAPEX	-0.0159	0.0368	0.0607	0.0700
TANG	0.1225	0.1063	0.4317	0.3655
SGA	-0.3727	-0.3036	-0.0284	-0.0093
TAX	-0.0764	-0.0528	-0.0228	-0.0172
DEPR	1.2796	1.0399	0.3970	0.1768
INDLEV	0.5381	0.4171	0.0966	0.0712
INDCL	-0.0409*	-0.0423**	0.0232*	0.0179
	(-1.94)	(-2.28)	(1.72)	(1.58)
INDCL1	-0.0343	-0.0295	0.0248	0.0231
	(-1.22)	(-1.19)	(1.37)	(1.52)
INDCL2	0.1194**	0.0633	0.1947***	0.1585***
	(2.06)	(1.24)	(5.24)	(5.10)
INDCL3	0.0766***	0.0498**	0.0544***	0.0470***
	(2.92)	(2.15)	(3.23)	(3.33)
INDCL4	0.1384***	0.0973***	0.0225	0.0197
	(5.02)	(4.01)	(1.27)	(1.33)
INDCL5	-0.0103	-0.0307	-0.0090	-0.0123
	(-0.29)	(-1.00)	(-0.40)	(-0.66)
STOCKMRT	0.1058	0.0160	0.0392	0.0305
LENDRT	1.7413	0.0404	-0.1357	-0.4528
INFLATION	0.8228	0.2765	0.5903	0.4557
_cons	-0.9574	-0.8306	-0.6403	-0.5924
R-sq	0.4287	0.3621	0.5208	0.5295
Prob > F	0.0000	0.0000	0.0000	0.0000

Table 21 demonstrates the main findings of the regression analysis of capital structure determinants for Vietnamese firms, specified in more detail below.

Table 21: Summary of findings

	Factors	Proxy	TDM (1)	TDC (2)	LDM (3)	LDC (4)	Sign of impact
Highly influential factors[25]	Firm size	**SIZE**	(+)	(+)	(+)	(+)	**(+)**
	Inflation rate	**INFLATION**	(+)	(+)	(+)	(+)	**(+)**
	Tangibility	**TANG**	(+)	(+)	(+)	(+)	**(+)**
	Business risk	**RISK**		(+)	(+)	(+)	**(+)**
	Stock market return	**STOCKMRT**	(+)	(+)	(+)		**(+)**
	Industry class[26] - Construction, Real Estate	**INDCL3**	(+)	(+)	(+)	(+)	**(+)**
	Industry class- Minerals	**INDCL2**	(+)		(+)	(+)	**(+)**
Moderately influential factors[27]	Profitability	**ROA**	(–)	(–)			**(–)**
	Growth opportunities	**GROWTH**	(–)		(–)		**(–)**
	Industry mean leverage	**INDLEV**		(+)		(+)	**(+)**
	Average lending rate	**LNDRT**	(+)			(–)	**(+/–)**
	Uniqueness	**SGA**			(+)	(+)	**(+)**
	Growth opportunities	**CAPEX**			(+)	(+)	**(+)**
	Industry class - Regulated	**INDCL**	(–)	(–)	(+)		**(–/+)**
	Industry class - Manufacturing	**INDCL4**	(+)	(+)			**(+)**
Irrelevant factors[28]	Average tax rate	**TAX**					NA[29]
	Non-debt tax shields	**DEPR**					NA
	Industry class - Petroleum, Electricity	**INDCL1**					NA
	Industry class-Tourism, Commerce	**INDCL5**					NA

[25] Have statistically significant relation to all four leverage measures, mostly at 0.01 significance level.
[26] Industry class means industry classification.
[27] Have statistically significant relation to three or two leverage measures, mostly at 0.01 significance level.
[28] Factors that do not have any statistically significant relation to any of leverage measures.
[29] Not available

The following are the key findings and justifications for the main capital structure factors identified in the above analysis and summarized in Table 21.

Group 1: Highly influential factors

This study has identified the six most important and reliable factors influencing the capital structure of Vietnamese listed firms. These are factors that either have statistically significant influences on all four leverage measures, or on three leverage ratios but mostly at a high significance level (α = 0.01 or 0.05). They are: 1) firm size (SIZE), 2) tangibility (TANG), 3) inflation rate (INFLATION) as a proxy for macroeconomic condition, 4) business risk (RISK), 5) stock market return (STOCKMRT) as a proxy for stock market condition, 6) industry classification for Construction, Construction Materials, and Real Estate industries (INDCL3) and Mineral industry (INDCL2).

1) Firm size

The study reveals that firm size (SIZE), measured by log of total assets, has a positive impact on the leverage of Vietnamese listed firms. Overall, larger firms will be more levered by debt financing, both in term of total debt or long-term debt. Also, whether debt ratios are measured with total debt or long-term debt, market value or book value of capital, this study finds strong evidence of the existence of a statistically significant relationship between firm size and leverage.

This finding rests on the premise of trade-off theory that larger and older firms are likely to borrow more due to having lower bankruptcy risk and ability to issue debt at lower costs thanks to better credibility. This finding is consistent with what can be observed in the capital market in Vietnam, where larger firms have more advantages and easier access to bank loans. In recent years, only large firms have been granted the ability to issue corporate bonds in the market.

This also confirms the assertion of pecking order theory that larger and older firms often build more internal equity, and thus have less of a tendency to borrow externally. From an empirical standpoint, this study reaches the same conclusion on the positive effect of firm size on leverage as the studies conducted Rajan and Zingales (1995), Huang and Song (2002), Bauer (2004), Frank and Goyal (2009), and especially, Phi Anh (2010) and Anh and Yen (2014) for Vietnamese firms.

2) Tangibility

Tangibility of assets (TANG) is found to have positive influence on leverage for Vietnamese listed firms. Firms that have a higher proportion of tangible assets will be more levered. This can be explained through trade-off theory, as firms can borrow at lower costs by using tangible assets as collaterals in debt financing – reducing the financial distress costs. This finding is also consistent with agency theory, since high tangibility helps reduce agency problems by preventing asset

substitution. Other studies that also found a positive relationship between tangibility and leverage include Rajan and Zingales (1995), Frank and Goyal (2009), Huang and Song (2002), Cortez and Susanto (2012), Nunkoo and Boateng (2010), and especially, Okuda and Nhung (2012) – in the case of Vietnam.

3) Inflation rate

According to the findings of this study, inflation rate (INFLATION) has a positive impact on leverage of Vietnamese listed firms. This finding matches the prediction made by trade-off theory that tax advantage is more valuable when inflation is high, therefore leverage and expected inflation have a positive relationship. This finding is also supported by market timing theory in that inflation leads to a lower real cost of debt, thus firms borrow more when inflation is high. On the empirical side of the matter, this finding agrees with Frank and Goyal (2009), but contradicts Chi (2013) on the direction of the impact of inflation on the leverage of Vietnamese firms.

4) Business risk

This study reveals that business risk has a positive influence on leverage of Vietnamese listed firms. The higher the business risk firms have, the more debt is used in firms' capital structure. This finding does not follow the prediction provided by trade-off theory that firms with more risky earnings should have less debt as they face higher financial distress costs from fixed commitments to debt

holders and benefit less from tax shields. Instead, the result confirms the principle of pecking order theory that firms with more risky earnings have higher levels of information asymmetry, and therefore have more debt. Vietnamese firms face a high level of business risk due to the highly volatile and risky business environment of a developing economy – especially in the financial crisis of 2010 and 2011. In response to this, Vietnamese firms have generally increased debt financing.

Empirically, this study disagrees with Bauer (2004) and Phi Anh (2010) about the direction of the relationship between leverage and business risk. These two studies conclude that business risk inversely affects leverage. However, the findings of this study agree with Huang and Song (2002), and especially, Nguyen and Ramachandran (2006) on the positive relationship between leverage and business risk for Vietnamese firms.

5) Stock market condition

The findings of this study also point out that stock market rate of return (STOCKMRT), as a proxy for stock market condition, has a positive impact on leverage ratios in Vietnamese listed firms; in other words, the firm's capital structure decision is influenced by movement in the stock market. More specifically, leverage moves in the same direction with stock market return. Although the finding agrees with market timing theories that stock market return

is one of the influential factors in determining firm capital structure, it conflicts with what is proposed under market timing theories in terms of the positivity or negativity of the relationship. As stock market return measures the average returns of all firms in the market, it can signal the average market expectation of the business performance of firms and the overall health of the economy. When stock market conditions are favorable, it is likely that firms will have better access to capital in general, and the debt market in particular, i.e. it will become easier to issue corporate bonds or borrow from banks at lower rate.

6) Industry classification

When examining some special industries, this study finds strong evidence regarding the relationship between leverage ratios and the industry the firm belongs to. Construction, Construction Materials, and Real Estate industries, represented by INDCL3, are found to have a positive influence on the debt ratios. This means that firms belonging to this group have higher leverage than others. From the period 2006 - 2007, Vietnam was booming with sizable construction projects, and construction and real estate companies often borrowed heavily to finance their operation. This led them to inherit high financial distress costs when the economy was in downturn during the last few years of this study.

The study also identifies that industry classification for the Minerals industry (INDCL2) has a positive relationship to leverage, demonstrating that

firms belonging to the Minerals industry have higher leverage than others. This finding confirms the observation of high leverage ratio of minerals companies by critics.

Group 2: Moderately influential factors

This study identifies factors that have moderate influence on the financial leverage of Vietnamese listed firms. These are factors that have either influenced only two leverage ratios out of four, or three leverage measures but at low significance level ($\alpha = 0.1$ or 0.05). They include: 1) profitability (ROA), 2) growth opportunities (GROWTH and CAPEX), 3) industry mean leverage, 4) average ending rate, as a proxy for debt market condition, 5) uniqueness, 6) industry classification for regulated industry (INDCL) and Manufacturing, Steel, Plastics and Packaging industries (INDCL4).

1) Profitability

The results show that profitability (ROA) has a negative impact on leverage for Vietnamese listed firms, yet only for total debt ratios, not long-term debt ratios. In general, when profitability increases, firms will borrow less, but will not change their long-term financing decisions. It can be inferred that profitability primarily influences the short-term debt of firms.

This finding is consistent with pecking order theory in that firms prefer internal financing to external financing, as proposed by Myers and Majluf (1984).

This finding also agrees with previous empirical studies that show an inverse relationship between profitability and leverage, such as Titman and Wessels (1988), Rajan and Zingales (1995), and Frank and Goyal (2009), Huang and Song (2002), Bauer (2004), Cortez and Susanto (2012), Kim et al. (2006), and especially Chi (2013) and Phi Anh (2010) for Vietnamese firms.

2) Growth opportunities

Growth opportunities (GROWTH), measured by market to book value of assets, is found to have an inverse influence on the debt level of listed Vietnamese firms. Firms having larger growth opportunities will borrow less. This finding is supported by trade-off theory in that firms having higher growth opportunities bear higher financial distress costs and have less free cash flow that could cause agency problems, so therefore they are less levered (Myers, 1977). Also, firms with more growth opportunities need higher flexibility in decision-making, without the constraints imposed on them by debt holders in debt covenants, in order to for them to use less debt.

This study provides similar findings to those of Rajan and Zingales (1995), Titman and Wessels (1988), Bauer (2004), Frank and Goyal (2009), Nunkoo and Boateng (2010) with regard to the negative relationship between growth opportunities and leverage. Chi (2013) also agrees on this conclusion for listed Vietnamese firms.

However, as capital expenditure (CAPEX) is another proxy for growth opportunities, it provides the contradictory result of a positive relationship between capital expenditure and leverage. This could be explained by the assertion that growth firms with increasing capital expenditure need more external financing, i.e. debt on priority – according to pecking order theory.

3) Industry mean leverage

The study also finds evidence of the impact of industry mean leverage (INDLEV) on firm leverage for book value leverage ratios. This is consistent with literature contending that firms follow industry mean leverage in their capital structure decisions, as demonstrated by Bradley et al. (1984), Harris and Raviv (1995), Long and Malitz (1985), Frank and Goyal (2009), Bauer (2004), and, especially, Chi (2013) for Vietnamese firms.

4) Industry classification

Table 20 and 21 show that whether or not firms belong to highly regulated industry, with dummy variable INDCL, affects capital structure decision. While firms in regulated industries have lower debt when leverage is measured by Total Debt to Market or Book Value of Capital (TDM or TDC), they have higher leverage in terms of long-term debt to market value of capital. This suggests that firms in strictly regulated industries tend to borrow more heavily in the long-term than firms in the other category. This is due to the fact that strictly regulated firms are

likely to be subjected to fewer risks and have a better ability to pay long-term debt.

In addition to Construction, Construction Materials, and Real Estate industries, and Minerals industry, the industry dummy for Manufacturing, Steel, Plastics and Packaging industries (INDCL4) is also found to have a significant influence on leverage to a moderate extent. This suggests that firms belonging to Manufacturing, Steel, and Plastics and Packaging industries are also more levered. However, this finding is only confirmed when measuring leverage with market value of capital.

5) Uniqueness

This study reveals that selling, general & administration expenses (SGA), as a proxy for the uniqueness of assets, positively influences long-term debt ratios. Although this finding conflicts with the theoretical prediction that firms having more unique assets will face higher financial distress costs, and thus – use less debt – it agrees with Titman and Wessels (1988) on the existence of an inverse relationship between uniqueness and leverage. This research provides the first study of uniqueness for Vietnamese firms. In general, with the exception of only few large firms, Vietnamese firms do not make much R&D expenditures, so SGA is a good indicator to begin analysis of the impact of uniqueness.

6) Average lending rate

Average lending rate, as a proxy for debt market condition, has an unclear impact on leverage, by showing positive impact on Total Debt to Market Value of Capital (TDM) but negative impact on Long-term Debt to Book Value of Capital (LDC) for Vietnamese listed firms. The former impact can be explained by the claim made by trade-off theory that when lending rate increases, firms can also borrow more to benefit from interest tax shields. The latter impact can be explained by the claim that firms will borrow less when the cost of funds is higher – especially for long-term debt which is more costly than short-term debt.

The financial market condition in Vietnam during the period of 2009-2013 was complex. In 2010 and 2011, inflation rates went up to 11.75% and 18.13%. Due to the economic recession during these two years, and the fact that market nominal interest rates go up when inflation rates rise, the average lending rates were very high as well. Firms were in need of more capital to fund their operations and create competitive advantage to survive in the recession. Consequently, they increased their borrowing even though the cost of funds was high. However, firms in Vietnam have been mostly using short-term loans due to easier access.

Group 3: Irrelevant factors

This study reveals that no significant relationship exists between industry classification and leverage for firms in Petroleum, Energy, Electricity, and Gas (INDCL1), and Service, Tourism and Commerce (INDCL5) industries.

The study also concludes that average tax rate (TAX), as a proxy for taxes, and non-debt tax shields (DEPR, or depreciation expense/total assets) have no relationship with leverage for Vietnamese listed firms. This finding is in disagreement with trade-off theory which contends that the higher the tax firms pay, the higher the value of the debt tax shields firms can gain. The findings of this study assert that non-debt tax shields have a negative relationship with leverage because they act as substitutes for interest tax shields. This study also contradicts the empirical findings of Bauer (2004), Huang and Song (2002), and Cortez and Susanto (2012).

CHAPTER 5: SUMMARY OF THE STUDY

A. SUMMARY AND CONCLUSIONS

This research studies publicly traded, non-financial Vietnamese firms over the period 2009 to 2013 to determine which factors have a reliable influence on market-based leverage. The sample consists of 183 firms on two stock exchanges (HOSE and HNX). The study bases itself upon four leverage measures and nineteen potential capital structure determinants, including six industry dummies, in order to gage the impact these factors have on firm leverage.

The study reveals that most of the factors have statistically significant influence on leverage measures to a certain extent. The most reliable and influential factors that explain the capital structure decisions of Vietnamese listed firms are: firm size; tangibility of assets; inflation rate, as a proxy for macroeconomic condition; business risk; stock market return, as a proxy for stock market condition; industry classifications for Construction, Construction Materials, and Real Estate industries and Mineral industry. The moderate influential factors include: profitability; growth opportunities; industry mean leverage; average ending rate, as a proxy for debt market condition; uniqueness; industry classification for regulated industry and Manufacturing, Steel, Plastics and Packaging industries. The study finds no evidence of the industry differences of firms belonging to Petroleum, and Energy, Electricity, and Gas industries and

Service and Tourism and Commerce industries, as well as the impact of average tax rate and depreciation expense, as a proxy for non-debt tax shields, on the leverage of Vietnamese listed firms.

The impacts by the most important factors are specified as follows.

- Larger firms tend to have higher leverage. Larger and older firms have better access to debt markets, i.e. bank loans and corporate bond issuance. This supports the prediction made by trade-off theory and pecking order theory.
- Firms having more tangible assets tend to have higher leverage. According to trade-off theory, higher tangibility makes borrowing easier because these firms possess more collateral and less financial distress costs. According to agency theory, this reduces agency problems by preventing assets substitution.
- When the inflation rate is expected to be high, firms tend to have higher leverage. According to trade-off theory, tax advantage is more valuable when inflation is high. Also, according to market timing theory, inflation leads to a lower real cost of debt.
- Firms subjected to higher business risk tend to have higher leverage. This confirms the argument made by pecking order theory that firms with more risky earnings have higher levels of information asymmetry, and therefore have more debt.

- When stock market return is high, firms tend to have higher leverage.
- Firms belonging to Construction, Construction Materials, and Real Estate industries and Minerals industries borrow more than others. These firms have a high need for capital due to the high level of investment in fixed assets.

The impacts of the moderately important factors are specified as follows.

- Firms that are more profitable tend to have lower leverage, in terms of total debt to market value or book value of capital. Profitable firms have more retained earnings, and therefore have less demand for external financing. This is consistent with pecking order theory. However, profitability does not affect the use of long-term debt.
- Firms having higher market to book value, or growth opportunities, tend to have lower leverage, yet this only holds for leverage measures in market value. Growth firms bear higher financial distress costs, have less free cash flow, have less agency problems, and need more flexibility – so they are less levered, according to trade-off theory and agency theory.
- Firms having higher capital expenditure, another proxy for growth opportunities, tend to have higher leverage. This supports pecking order theory as firms with increasing capital expenditure need more external financing and prefer debt.

- Firms follow industry average leverage in choosing their debt level, when leverage is defined as total debt or long-term debt to book value of capital.
- Firms belonging to highly regulated industries have lower leverage in terms of total debt measures, but higher leverage when measured by long-term debt to market value of capital. These firms tend to borrow more heavily in the long-term as they are likely to shoulder less risk and have a better ability to pay long-term debt.
- Firms belonging to Manufacturing, Steel, Plastics and Packaging industries have higher leverage than others, in terms of debt to market value of capital. These firms have high levels of investment in fixed assets.
- Firms with higher selling, general & administration expenses, as a proxy for uniqueness of assets, tend to have higher leverage. When average lending rate on the market – a proxy for debt market condition, is high – firms tend to have higher total debt to market value of capital, while at the same time having lower long-term debt to book value of capital. This implies that firms borrow less long-term debt and more short-term debt when lending rates increase. Firms have better access to short-term rather than long-term loans and lower borrowing costs.

This study agrees with certain findings that have been proposed by various studies carried out in Vietnam, still it brings about a number of new perspectives

on the subject. In accordance with Chi (2013), this study also demonstrates the impact of profitability (ROA), growth opportunities (market to book value of assets ratio), and inflation on leverage. Both studies have revealed an inverse relationship between profitability and leverage, and market to book ratio and leverage. The two studies, however, disagree on whether the relationship between leverage and inflation is positive or negative. The findings in this study show relevance to market timing theories, suggesting the relationship between leverage and inflation is a positive one. On the contrary, the results of Chi (2013) support the pecking-order theory that inflation has a negative influence on leverage. In comparison to Chi (2013), the research in this study has been conducted on a larger scale, incorporating a greater number of observations conducted over a longer and more recent time period.

With respect to the study by Anh and Yen (2014) which focuses only HOSE firms, this research covers a broader spectrum of firms from both stock exchanges (HOSE and HNX), providing the study with a larger data set, and longer time horizon. Using the similar methodology of fixed-effects regression model, Anh and Yen (2014) concluded that firm size and profitability determine capital structure, and these factors are also among the results in this study. Although both studies show a positive relationship between firm size and leverage, they are in conflict over the impact of profitability on leverage. In contrast to Anh and

Yen (2004) who identified taxes as one of the key determinants of capital structure, this study does not find taxes to have any significant influence on leverage.

Although the study conducted by Phi Anh (2010) used a different methodology, this study shares the same conclusion that business risk, tangibility (asset structure), firm size, and profitability are factors influencing debt ratio. The two studies are also similar in concluding a negative influence of profitability and positive influence of firm size, but in conflict over the influence of tangibility.

The analysis in this study has largely rested on the well-known capital structure theories as presented in Chapter 3: trade-off theory, agency theory, free cash flow theory, pecking order theory, and market timing theories. This study has leveraged on the four most popular capital structure theories to explain the results. It can be seen that the capital structure decisions in Vietnamese firms have been partly following the classic theories that explain capital structure decisions in other countries. However, in an emerging and developing economy, the capital structure decisions of Vietnamese firms have not been rationalized to follow a clear approach. Thus, the impacts of such factors as stock market return and average lending rate are not well-supported by capital structure theories in the case of Vietnam.

In conclusion, this paper provides a more comprehensive study of capital structure of Vietnamese listed firms than current empirical studies, and significantly contributes to the literature. This study utilizes a larger sample of firms and a longer time period, making for a much larger set of observations. It also studies firms on the two stock exchanges. As well, the use of panel data and advanced econometrics methods are highly notable. More importantly, the study includes most of the determinants of capital structure as suggested by previous theoretical and empirical researchers, internationally and in Vietnam. The study is highly relevant in for Vietnamese firms, because it uses updated data in the most recent time, and looks at the capital market after government deregulation and after the market collapse in 2008.

B. LIMITATIONS OF THE STUDY

Firstly, despite having a large data set, the study fails to include some relevant factors that were proposed by some previous studies, such as manager behaviors and state ownership. If these factors are incorporated in this study, the analysis will be more comprehensive. In addition, the study could also have included more measures of the factors being studied, such as industry average growth rate as a proxy for industry condition, and growth in GDP as a proxy for macroeconomic condition. The reason this study does not include such factors is due to limited availability of databases and the long process involved in collecting

data from diverse and un-unified sources for data in the case of state ownership and manager behaviors.

Secondly, although the five-year period provides a longer time series than most other Vietnamese capital structure research projects, this is still a short time period relative to the credible studies worldwide, such as Frank and Goyal (2009) who study spans over a 50-year horizon. Considering only a five-year period during which there were many notable changes in macroeconomics and business environments is likely to affect the reliability of the results.

Thirdly, the analysis of capital structure theories needs to be improved. The study has not examined the relation of capital structure decisions to trade-off theories, agency theory, free cash flow theory, pecking order theory, and market timing theory, which was done briefly in Chi (2013).

C. SUGGESTIONS FOR FUTURE RESEARCH

Followings are some suggestions for future research in the field to improve upon this study. *Firstly*, it is necessary to use a more complete set of capital structure factors. As mentioned above, factors such as manager behaviors and state ownership should also be considered in the analysis. *Secondly*, it is possible to expand the time horizon of the study. The stock exchanges in Vietnam began operating in 2000 and 2006, allowing researchers to collect a broader range of data in a longer time period. *Thirdly*, clarifying the application of the four capital

structure theories in capital structure decisions of Vietnamese firms is also important. Proper methods and analysis can be used to achieve this. *Fourthly*, it is important to study the capital structure determinants for specific industries separately in order to understand the capital structure behaviors pertaining to each industry and to remove the industry difference that may provide biased results. Despite the fact that industry dummies are included in this study, it is not sufficient to allow the identification of relevant factors that influence capital structure firms within an industry. There were studies done previously for manufacturing companies in Vietnam, but those are weak in methodology and not persuasive in their analysis. *Finally*, it is practical to investigate the changes in capital structure decisions and determinants before and after privatization of Vietnamese (listed and non-listed) firms. As mentioned above, a large number of Vietnamese firms were state-owned before the privatization process was widely implemented. It is possible to apply statistical tests and econometric methods to identify the difference before and after such changes, despite the fact that data collection will be a challenge.

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APPENDICES

Appendix 1: Fixed-effects regression with TDM on all factors except dummies

Fixed-effects (within) regression		Number of obs	= 915
Group variable: code		Number of groups	= 183
R-sq: within = 0.4066		Obs per group: min	= 5
between = 0.1700		avg	= 5.0
overall = 0.1916		max	= 5
		F(13,719)	= 37.89
corr(u_i, Xb) = -0.5888		Prob > F	= 0.0000

TDM	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	-0.3040	0.2304	-1.32	0.1870	-0.7562	0.1482
ROA	-0.7047	0.1170	-6.02	0.0000	-0.9344	-0.4749
SIZE	0.4865	0.0547	8.90	0.0000	0.3792	0.5939
GROWTH	-0.1457	0.0175	-8.31	0.0000	-0.1801	-0.1113
CAPEX	0.0438	0.0567	0.77	0.4400	-0.0676	0.1552
TANG	0.1407	0.0632	2.23	0.0260	0.0167	0.2647
SGA	0.0009	0.0531	0.02	0.9870	-0.1035	0.1052
TAX	-0.0395	0.0290	-1.36	0.1730	-0.0964	0.0174
DEPR	0.3730	0.4236	0.88	0.3790	-0.4585	1.2046
INDLEV	0.2315	0.1479	1.56	0.1180	-0.0589	0.5220
STOCKMRT	0.1539	0.0357	4.31	0.0000	0.0838	0.2240
LENDRT	1.3964	0.2586	5.40	0.0000	0.8886	1.9042
INFLATION	1.0352	0.1927	5.37	0.0000	0.6570	1.4134
_cons	-2.6825	0.3193	-8.40	0.0000	-3.3094	-2.0555
sigma_u	0.28239					
sigma_e	0.12024					
rho	0.84652	(fraction of variance due to u_i)				

F test that all u_i=0: F(182, 719) = 13.04 Prob > F = 0.0000

Appendix 2: Random-effects regression with TDM on all factors except dummies

Random-effects GLS regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.3798		Obs per group: min =	5
between = 0.3271		avg =	5.0
overall = 0.3392		max =	5
Random effects u_i ~ Gaussian		Wald chi2(13) =	526.13
corr(u_i, X) = 0 (assumed)		Prob > chi2 =	0.0000

TDM	Coef.	Std. Err.	z	P>z	[95% Conf.	Intervals]
RISK	-0.4239	0.2256	-1.88	0.0600	-0.8661	0.0183
ROA	-0.7573	0.1116	-6.78	0.0000	-0.9761	-0.5385
SIZE	0.1980	0.0241	8.21	0.0000	0.1507	0.2452
GROWTH	-0.1424	0.0173	-8.25	0.0000	-0.1762	-0.1086
CAPEX	0.0666	0.0569	1.17	0.2410	-0.0448	0.1781
TANG	0.1185	0.0523	2.26	0.0240	0.0159	0.2210
SGA	-0.0649	0.0523	-1.24	0.2150	-0.1673	0.0376
TAX	-0.0397	0.0293	-1.36	0.1750	-0.0971	0.0177
DEPR	0.7086	0.3372	2.10	0.0360	0.0476	1.3696
INDLEV	0.5569	0.0964	5.78	0.0000	0.3680	0.7458
STOCKMRT	0.1069	0.0359	2.98	0.0030	0.0366	0.1772
LENDRT	1.5737	0.2572	6.12	0.0000	1.0696	2.0778
INFLATION	0.7505	0.1914	3.92	0.0000	0.3754	1.1257
_cons	-1.1799	0.1543	-7.65	0.0000	-1.4824	-0.8774
sigma_u	0.18267					
sigma_e	0.12024					
Rho	0.69771	(fraction of variance due to u_i)				

Appendix 3: Hausman test results for TDM models

Coefficients ----

	(b) fem1	(B) rem1	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
RISK	-0.3040	-0.4239	0.1199	0.0722
ROA	-0.7047	-0.7573	0.0526	0.0450
SIZE	0.4865	0.1980	0.2886	0.0508
GROWTH	-0.1457	-0.1424	-0.0033	0.0052
CAPEX	0.0438	0.0666	-0.0228	0.0132
TANG	0.1407	0.1185	0.0222	0.0385
SGA	0.0009	-0.0649	0.0657	0.0159
TAX	-0.0395	-0.0397	0.0002	0.0055
DEPR	0.3730	0.7086	-0.3356	0.2757
INDLEV	0.2315	0.5569	-0.3253	0.1177
STOCKMRT	0.1539	0.1069	0.0470	0.0079
LENDRT	1.3964	1.5737	-0.1773	0.0678
INFLATION	1.0352	0.7505	0.2847	0.0512

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 58.55
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Appendix 4: Fixed-effects regression with TDC on all factors except dummies

Fixed-effects (within) regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.2406		Obs per group: min =	5
between = 0.1973		avg =	5.0
overall = 0.1893		max =	5
		F(13,719) =	17.53
corr(u_i, Xb) = -0.6415		Prob > F =	0.0000

TDC	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
RISK	0.2962	0.1756	1.69	0.0920	-0.0486	0.6409
ROA	-0.4763	0.0892	-5.34	0.0000	-0.6514	-0.3012
SIZE	0.4589	0.0417	11.01	0.0000	0.3770	0.5407
GROWTH	-0.0201	0.0134	-1.50	0.1330	-0.0463	0.0062
CAPEX	0.0678	0.0433	1.57	0.1180	-0.0171	0.1527
TANG	0.1537	0.0481	3.19	0.0010	0.0591	0.2482
SGA	0.0553	0.0405	1.36	0.1730	-0.0242	0.1348
TAX	-0.0193	0.0221	-0.88	0.3820	-0.0627	0.0240
DEPR	-0.1171	0.3229	-0.36	0.7170	-0.7510	0.5168
INDLEV	0.2118	0.1128	1.88	0.0610	-0.0096	0.4332
STOCKMRT	0.0591	0.0272	2.17	0.0300	0.0057	0.1126
LENDRT	-0.2882	0.1972	-1.46	0.1440	-0.6753	0.0989
INFLATION	0.4370	0.1469	2.98	0.0030	0.1486	0.7253
_cons	-2.4313	0.2434	-9.99	0.0000	-2.9092	-1.9534

sigma_u	0.2530242	
sigma_e	0.0916566	
Rho	0.8840006	(fraction of variance due to u_i)

F test that all u_i=0: F(182, 719) = 18.36 Prob > F = 0.0000

Appendix 5: Random-effects regression with TDC on all factors except dummies

Random-effects GLS regression		Number of obs	= 915
Group variable: code		Number of groups	= 183
R-sq: within = 0.2064		Obs per group: min	= 5
between = 0.2787		avg	= 5.0
overall = 0.2638		max	= 5
Random effects u_i ~ Gaussian		Wald chi2(13)	= 246.58
corr(u_i, X) = 0 (assumed)		Prob > chi2	= 0.0000

TDC	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
RISK	0.1786	0.1754	1.02	0.3090	-0.1653	0.5224
ROA	-0.5195	0.0873	-5.95	0.0000	-0.6907	-0.3483
SIZE	0.2190	0.0211	10.39	0.0000	0.1777	0.2603
GROWTH	-0.0186	0.0134	-1.39	0.1660	-0.0448	0.0077
CAPEX	0.0900	0.0439	2.05	0.0400	0.0039	0.1761
TANG	0.1369	0.0422	3.24	0.0010	0.0542	0.2197
SGA	0.0084	0.0406	0.21	0.8360	-0.0712	0.0880
TAX	-0.0180	0.0226	-0.80	0.4260	-0.0623	0.0263
DEPR	0.1787	0.2738	0.65	0.5140	-0.3579	0.7153
INDLEV	0.4213	0.0811	5.20	0.0000	0.2624	0.5802
STOCKMRT	0.0216	0.0276	0.78	0.4340	-0.0325	0.0757
LENDRT	-0.1203	0.1983	-0.61	0.5440	-0.5089	0.2683
INFLATION	0.2069	0.1474	1.40	0.1600	-0.0820	0.4958
_cons	-1.1522	0.1326	-8.69	0.0000	-1.4122	-0.8922
sigma_u	0.166592					
sigma_e	0.0916566					
Rho	0.7676339	(fraction of variance due to u_i)				

Appendix 6: Hausman test results for TDC models

Coefficients ----

	(b) fem2	(B) rem2	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
RISK	0.2962	0.1786	0.1176	0.0478
ROA	-0.4763	-0.5195	0.0432	0.0301
SIZE	0.4589	0.2190	0.2398	0.0377
GROWTH	-0.0201	-0.0186	-0.0015	0.0034
CAPEX	0.0678	0.0900	-0.0222	0.0088
TANG	0.1537	0.1369	0.0167	0.0265
SGA	0.0553	0.0084	0.0469	0.0106
TAX	-0.0193	-0.0180	-0.0013	0.0036
DEPR	-0.1171	0.1787	-0.2958	0.1920
INDLEV	0.2118	0.4213	-0.2095	0.0840
STOCKMRT	0.0591	0.0216	0.0375	0.0058
LENDRT	-0.2882	-0.1203	-0.1679	0.0488
INFLATION	0.4370	0.2069	0.2300	0.0375

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 70.23
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Appendix 7: Fixed-effects regression with LDM on all factors except dummies

Fixed-effects (within) regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.1779		Obs per group: min =	5
between = 0.4691		avg =	5.0
overall = 0.4209		max =	5
		F(13,719) =	11.96
corr(u_i, Xb) = 0.1423		Prob > F =	0.0000

LDM	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	0.4435	0.1547	2.87	0.0040	0.1398	0.7472
ROA	-0.1038	0.0786	-1.32	0.1870	-0.2581	0.0505
SIZE	0.1321	0.0367	3.60	0.0000	0.0601	0.2042
GROWTH	-0.0522	0.0118	-4.44	0.0000	-0.0753	-0.0291
CAPEX	0.0767	0.0381	2.01	0.0450	0.0018	0.1515
TANG	0.2978	0.0424	7.02	0.0000	0.2145	0.3811
SGA	0.1594	0.0357	4.47	0.0000	0.0893	0.2295
TAX	-0.0220	0.0195	-1.13	0.2590	-0.0602	0.0162
DEPR	0.1703	0.2844	0.60	0.5500	-0.3882	0.7287
INDLEV	0.1060	0.0994	1.07	0.2870	-0.0891	0.3010
STOCKMRT	0.0407	0.0240	1.70	0.0900	-0.0064	0.0878
LENDRT	-0.1539	0.1737	-0.89	0.3760	-0.4950	0.1871
INFLATION	0.4523	0.1294	3.50	0.0010	0.1983	0.7063
_cons	-0.7716	0.2145	-3.60	0.0000	-1.1926	-0.3506

sigma_u	0.132547	
sigma_e	0.080748	
rho	0.729324	(fraction of variance due to u_i)

F test that all u_i=0: F(182, 719) = 10.93 Prob > F = 0.0000

Appendix 8: Random-effects regression with LDM on all factors except dummies

Random-effects GLS regression		Number of obs	= 915
Group variable: code		Number of groups	= 183
R-sq: within = 0.1693		Obs per group: min	= 5
between = 0.5355		avg	= 5.0
overall = 0.4742		max	= 5
Random effects u_i ~ Gaussian		Wald chi2(13)	= 359.05
corr(u_i, X) = 0 (assumed)		Prob > chi2	= 0.0000

LDM	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
RISK	0.3214	0.1484	2.17	0.0300	0.0305	0.6123
ROA	-0.1755	0.0732	-2.40	0.0170	-0.3189	-0.0320
SIZE	0.1195	0.0149	7.99	0.0000	0.0902	0.1488
GROWTH	-0.0551	0.0114	-4.84	0.0000	-0.0774	-0.0328
CAPEX	0.0812	0.0376	2.16	0.0310	0.0076	0.1548
TANG	0.3493	0.0337	10.36	0.0000	0.2832	0.4154
SGA	0.1277	0.0344	3.71	0.0000	0.0602	0.1952
TAX	-0.0231	0.0194	-1.19	0.2340	-0.0610	0.0149
DEPR	0.6554	0.2167	3.03	0.0020	0.2308	1.0800
INDLEV	0.2373	0.0608	3.90	0.0000	0.1181	0.3564
STOCKMRT	0.0335	0.0238	1.41	0.1590	-0.0131	0.0801
LENDRT	-0.2137	0.1702	-1.26	0.2090	-0.5472	0.1199
INFLATION	0.4496	0.1267	3.55	0.0000	0.2013	0.6980
_cons	-0.7804	0.0966	-8.08	0.0000	-0.9697	-0.5910
sigma_u	0.112086					
sigma_e	0.080748					
Rho	0.658329	(fraction of variance due to u_i)				

Appendix 9: Hausman Test results for LDM models

Coefficients ----

	(b) fem3	(B) rem3	(b-B) Difference	sqrt(diag(V_b V_B)) S.E.
RISK	0.4435	0.3214	0.1221	0.0437
ROA	-0.1038	-0.1755	0.0717	0.0286
SIZE	0.1321	0.1195	0.0127	0.0335
GROWTH	-0.0522	-0.0551	0.0029	0.0030
CAPEX	0.0767	0.0812	-0.0045	0.0065
TANG	0.2978	0.3493	-0.0515	0.0257
SGA	0.1594	0.1277	0.0317	0.0094
TAX	-0.0220	-0.0231	0.0011	0.0019
DEPR	0.1703	0.6554	-0.4851	0.1843
INDLEV	0.1060	0.2373	-0.1313	0.0786
STOCKMRT	0.0407	0.0335	0.0072	0.0032
LENDRT	-0.1539	-0.2137	0.0597	0.0347
INFLATION	0.4523	0.4496	0.0027	0.0261

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)

54.2

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

Appendix 10: Fixed-effects regression with LDC on all factors except for dummies

Fixed-effects (within) regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.2048		Obs per group: min =	5
between = 0.4693		avg =	5.0
overall = 0.4288		max =	5
		F(13,719) =	14.24
corr(u_i, Xb) = 0.1725		Prob > F =	0.0000

LDC	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	0.4798	0.1223	3.92	0.0000	0.2398	0.7199
ROA	-0.0534	0.0621	-0.86	0.3900	-0.1753	0.0686
SIZE	0.1057	0.0290	3.64	0.0000	0.0487	0.1626
GROWTH	-0.0151	0.0093	-1.62	0.1050	-0.0334	0.0032
CAPEX	0.0848	0.0301	2.82	0.0050	0.0257	0.1439
TANG	0.2652	0.0335	7.91	0.0000	0.1994	0.3310
SGA	0.1613	0.0282	5.72	0.0000	0.1059	0.2166
TAX	-0.0155	0.0154	-1.01	0.3150	-0.0457	0.0147
DEPR	-0.2463	0.2248	-1.10	0.2740	-0.6877	0.1950
INDLEV	0.1506	0.0785	1.92	0.0550	-0.0035	0.3048
STOCKMRT	0.0259	0.0190	1.37	0.1720	-0.0113	0.0631
LENDRT	-0.4669	0.1373	-3.40	0.0010	-0.7365	-0.1974
INFLATION	0.2942	0.1023	2.88	0.0040	0.0935	0.4950
_cons	-0.6222	0.1695	-3.67	0.0000	-0.9550	-0.2895
sigma_u	0.113513					
sigma_e	0.06382					
Rho	0.75982	(fraction of variance due to u_i)				

F test that all u_i=0: F(182, 719) = 12.71 Prob > F = 0.0000

Appendix 11: Random-effects regression with LDC on all factors except dummies

Random-effects GLS regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.1954		Obs per group: min =	5
between = 0.5262		avg =	5.0
overall = 0.4762		max =	5
Random effects u_i ~ Gaussian		Wald chi2(13) =	384.19
corr(u_i, X) = 0 (assumed)		Prob > chi2 =	0.0000

LDC	**Coef.**	**Std.Err.**	**Z**	**P>z**	**[95% Conf.**	**Interval]**
RISK	0.4022	0.1185	3.39	0.0010	0.1700	0.6344
ROA	-0.1128	0.0586	-1.92	0.0540	-0.2276	0.0021
SIZE	0.1120	0.0125	8.94	0.0000	0.0875	0.1366
GROWTH	-0.0173	0.0091	-1.91	0.0560	-0.0351	0.0005
CAPEX	0.0886	0.0299	2.97	0.0030	0.0301	0.1472
TANG	0.3046	0.0274	11.12	0.0000	0.2509	0.3583
SGA	0.1365	0.0275	4.97	0.0000	0.0826	0.1903
TAX	-0.0167	0.0154	-1.08	0.2780	-0.0469	0.0135
DEPR	0.2228	0.1764	1.26	0.2070	-0.1230	0.5686
INDLEV	0.2133	0.0503	4.24	0.0000	0.1148	0.3118
STOCKMRT	0.0234	0.0189	1.24	0.2150	-0.0136	0.0604
LENDRT	-0.5172	0.1352	-3.83	0.0000	-0.7822	-0.2522
INFLATION	0.3111	0.1006	3.09	0.0020	0.1139	0.5083
_cons	-0.7054	0.0804	-8.78	0.0000	-0.8630	-0.5479
sigma_u	0.095522					
sigma_e	0.06382					
Rho	0.691377	(fraction of variance due to u_i)				

Appendix 12: Hausman test results for LDC models

Coefficients ----

	(b) fem4	(B) rem4	(b-B) Difference	sqrt(diag(V_b V_B)) S.E.
RISK	0.4798	0.4022	0.0776	0.0302
ROA	-0.0534	-0.1128	0.0594	0.0206
SIZE	0.1057	0.1120	-0.0064	0.0262
GROWTH	-0.0151	-0.0173	0.0022	0.0021
CAPEX	0.0848	0.0886	-0.0038	0.0038
TANG	0.2652	0.3046	-0.0394	0.0193
SGA	0.1613	0.1365	0.0248	0.0064
TAX	-0.0155	-0.0167	0.0012	.
DEPR	-0.2463	0.2228	-0.4691	0.1393
INDLEV	0.1506	0.2133	-0.0626	0.0603
STOCKMRT	0.0259	0.0234	0.0025	0.0019
LENDRT	-0.4669	-0.5172	0.0503	0.0238
INFLATION	0.2942	0.3111	-0.0169	0.0182

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(13) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 97.33
Prob>chi2 = 0.0000
(V_b-V_B is not positive definite)

Appendix 13: Fixed-effects regression with TDM and selected factors

Fixed-effects (within) regression		Number of obs	= 915
Group variable: code		Number of groups	= 183
R-sq: within = 0.4009		Obs per group: min	= 5
between = 0.1359		avg	= 5.0
overall = 0.1601		max	= 5
		F(7,725)	= 69.30
corr(u_i, Xb) = -0.6078		Prob > F	= 0.0000

TDM	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
ROA	-0.7432	0.1122	-6.6200	0.0000	-0.9635	-0.5229
SIZE	0.4976	0.0535	9.3000	0.0000	0.3926	0.6027
GROWTH	-0.1450	0.0175	-8.3000	0.0000	-0.1793	-0.1107
TANG	0.1567	0.0592	2.6500	0.0080	0.0406	0.2728
STOCKMRT	0.1699	0.0351	4.8400	0.0000	0.1010	0.2388
LENDRT	1.4730	0.2526	5.8300	0.0000	0.9770	1.9690
INFLATION	1.0786	0.1900	5.6800	0.0000	0.7056	1.4515
_cons	-2.6350	0.3130	-8.4200	0.0000	-3.2494	-2.0205
sigma_u	0.29389					
sigma_e	0.12031					
Rho	0.85646	(fraction of variance due to u_i)				

F test that all u_i=0: F(182, 725) = 16.50 Prob > F = 0.0000

Appendix 14: Fixed-effects regression with TDC and selected factors

Fixed-effects (within) regression Number of obs = 915
Group variable: code Number of groups = 183

R-sq: within = 0.2307 Obs per group: min = 5
between = 0.2008 avg = 5.0
overall = 0.1916 max = 5

F(7,725) = 31.06
corr(u_i, Xb) = -0.6309 Prob > F = 0.0000

TDC	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	0.3067	0.1749	1.7500	0.0800	-0.0367	0.6502
ROA	-0.5055	0.0862	-5.8700	0.0000	-0.6746	-0.3363
SIZE	0.4481	0.0407	11.0100	0.0000	0.3682	0.5280
TANG	0.1593	0.0449	3.5500	0.0000	0.0712	0.2475
INDLEV	0.1889	0.1107	1.7100	0.0880	-0.0285	0.4063
STOCKMRT	0.0876	0.0197	4.4400	0.0000	0.0488	0.1263
INFLATION	0.5484	0.1357	4.0400	0.0000	0.2820	0.8147
_cons	-2.4275	0.2404	-10.1000	0.0000	-2.8995	-1.9555
sigma_u	0.2495					
sigma_e	0.091872					
rho	0.8805699	(fraction of variance due to u_i)				

F test that all u_i=0: F(182, 725) = 19.40 Prob > F = 0.0000

Appendix 15: Fixed-effects regression with LDM and selected factors

Fixed-effects (within) regression		Number of obs	= 915
Group variable: code		Number of groups	= 183
R-sq: within = 0.1723		Obs per group: min	= 5
between = 0.4202		avg	= 5.0
overall = 0.3795		max	= 5
	F(8,724)	=	18.85
corr(u_i, Xb) = 0.0982	Prob > F	=	0.0000

LDM	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	0.4127	0.1528	2.7	0.0070	0.1128	0.7127
SIZE	0.1327	0.0350	3.79	0.0000	0.0639	0.2014
GROWTH	-0.0528	0.0114	-4.62	0.0000	-0.0752	-0.0304
CAPEX	0.0733	0.0374	1.96	0.0500	-0.0000	0.1467
TANG	0.3076	0.0414	7.43	0.0000	0.2263	0.3889
SGA	0.1748	0.0347	5.04	0.0000	0.1067	0.2429
STOCKMRT	0.0525	0.0174	3.02	0.0030	0.0183	0.0867
INFLATION	0.4635	0.1165	3.98	0.0000	0.2348	0.6922
_cons	-0.7471	0.2100	-3.56	0.0000	-1.1594	-0.3348
sigma_u	0.137702					
sigma_e	0.080738					
Rho	0.74417	(fraction of variance due to u_i)				

F test that all u_i=0: F(182, 724) = 12.95 Prob > F = 0.0000

Appendix 16: Fixed-effects regression with LDC and selected factors

Fixed-effects (within) regression		Number of obs =	915
Group variable: code		Number of groups =	183
R-sq: within = 0.1961		Obs per group: min =	5
between = 0.4819		avg =	5.0
overall = 0.4380		max =	5
	F(8,724)	=	22.08
corr(u_i, Xb) = 0.1890	Prob > F	=	0.0000

LDC	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
RISK	0.4572	0.1209	3.7800	0.0000	0.2199	0.6945
SIZE	0.0977	0.0281	3.4700	0.0010	0.0424	0.1529
CAPEX	0.0874	0.0296	2.9500	0.0030	0.0292	0.1455
TANG	0.2572	0.0327	7.8600	0.0000	0.1929	0.3214
SGA	0.1701	0.0275	6.1900	0.0000	0.1161	0.2241
INDLEV	0.1733	0.0772	2.2400	0.0250	0.0217	0.3248
LENDRT	-0.5456	0.0969	-5.6300	0.0000	-0.7357	-0.3554
INFLATION	0.1781	0.0560	3.1800	0.0020	0.0682	0.2880
_cons	-0.5906	0.1585	-3.7300	0.0000	-0.9017	-0.2795

sigma_u	0.112536	
sigma_e	0.063945	
Rho	0.755934	(fraction of variance due to u_i)

F test that all u_i=0: F(182, 724) = 13.71 Prob > F = 0.0000

Appendix 17: Pooled OLS regression with TDM and all factors

Source	SS	df	MS	Number of obs	=	915
				F(19, 895)	=	35.35
Model	30.6545	19	1.6134	Prob > F	=	0.0000
Residual	40.8478	895	0.0456	R-squared	=	0.4287
				Adj R-squared	=	0.4166
Total	71.5022	914	0.0782	Root MSE	=	0.21364

TDM	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
RISK	-0.6135	0.2774	-2.2100	0.0270	-1.1579	-0.0692
ROA	-1.0079	0.1315	-7.6600	0.0000	-1.2660	-0.7497
SIZE	0.1522	0.0142	10.7000	0.0000	0.1243	0.1801
GROWTH	-0.0945	0.0227	-4.1600	0.0000	-0.1391	-0.0499
CAPEX	-0.0159	0.0851	-0.1900	0.8520	-0.1829	0.1511
TANG	0.1225	0.0457	2.6800	0.0070	0.0328	0.2123
SGA	-0.3727	0.0684	-5.4500	0.0000	-0.5070	-0.2384
TAX	-0.0764	0.0436	-1.7500	0.0800	-0.1620	0.0092
DEPR	1.2796	0.3452	3.7100	0.0000	0.6021	1.9572
INDLEV	0.5381	0.0929	5.7900	0.0000	0.3558	0.7204
INDCL	-0.0409	0.0210	-1.9400	0.0520	-0.0822	0.0004
INDCL1	-0.0343	0.0282	-1.2200	0.2240	-0.0896	0.0210
INDCL2	0.1194	0.0579	2.0600	0.0390	0.0058	0.2331
INDCL3	0.0766	0.0262	2.9200	0.0040	0.0251	0.1281
INDCL4	0.1384	0.0275	5.0200	0.0000	0.0843	0.1924
INDCL5	-0.0103	0.0349	-0.2900	0.7690	-0.0788	0.0583
STOCKMRT	0.1058	0.0614	1.7200	0.0850	-0.0148	0.2263
LENDRT	1.7413	0.4334	4.0200	0.0000	0.8908	2.5918
INFLATION	0.8228	0.3239	2.5400	0.0110	0.1870	1.4585
_cons	-0.9574	0.1254	-7.6400	0.0000	-1.2034	-0.7113

Appendix 18: Pooled OLS regression with TDC and all factors

Source	SS	df	MS	Number of obs	=	915
				F(19, 895)	=	26.74
Model	18.008724	19	0.9478	Prob > F	=	0.0000
Residual	31.729558	895	0.0355	R-squared	=	0.3621
				Adj R-squared	=	0.3485
Total	49.738282	914	0.0544	Root MSE	=	0.18829

TDC	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
RISK	-0.1705	0.2445	-0.7000	0.4860	-0.6503	0.3092
ROA	-0.7875	0.1159	-6.7900	0.0000	-1.0150	-0.5599
SIZE	0.1594	0.0125	12.7100	0.0000	0.1348	0.1840
GROWTH	0.0270	0.0200	1.3500	0.1780	-0.0123	0.0663
CAPEX	0.0368	0.0750	0.4900	0.6240	-0.1104	0.1840
TANG	0.1063	0.0403	2.6400	0.0080	0.0272	0.1854
SGA	-0.3036	0.0603	-5.0300	0.0000	-0.4219	-0.1852
TAX	-0.0528	0.0385	-1.3700	0.1700	-0.1283	0.0227
DEPR	1.0399	0.3043	3.4200	0.0010	0.4428	1.6371
INDLEV	0.4171	0.0819	5.0900	0.0000	0.2564	0.5777
INDCL	-0.0423	0.0185	-2.2800	0.0230	-0.0787	-0.0059
INDCL1	-0.0295	0.0248	-1.1900	0.2350	-0.0783	0.0192
INDCL2	0.0633	0.0510	1.2400	0.2150	-0.0369	0.1634
INDCL3	0.0498	0.0231	2.1500	0.0320	0.0044	0.0952
INDCL4	0.0973	0.0243	4.0100	0.0000	0.0497	0.1449
INDCL5	-0.0307	0.0308	-1.0000	0.3190	-0.0911	0.0297
STOCKMRT	0.0160	0.0541	0.3000	0.7670	-0.0902	0.1223
LENDRT	0.0404	0.3819	0.1100	0.9160	-0.7092	0.7900
INFLATION	0.2765	0.2855	0.9700	0.3330	-0.2839	0.8368
_cons	-0.8306	0.1105	-7.5200	0.0000	-1.0475	-0.6138

Appendix 19: Pooled OLS regression with LDM and all factors

Source	SS	df	MS	Number of obs	=	915
				F(19, 895)	=	51.19
Model	18.3025	19	0.9632	Prob > F	=	0.0000
Residual	16.8416	895	0.0188	R-squared	=	0.5208
				Adj R-squared	=	0.5106
Total	35.1441	914	0.0385	Root MSE	=	0.13718

LDM	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
RISK	-0.2242	0.1781	-1.2600	0.2080	-0.5737	0.1254
ROA	-0.4959	0.0845	-5.8700	0.0000	-0.6617	-0.3302
SIZE	0.1025	0.0091	11.2300	0.0000	0.0846	0.1205
GROWTH	-0.0429	0.0146	-2.9400	0.0030	-0.0715	-0.0142
CAPEX	0.0607	0.0547	1.1100	0.2670	-0.0466	0.1679
TANG	0.4317	0.0294	14.7100	0.0000	0.3741	0.4893
SGA	-0.0284	0.0439	-0.6500	0.5190	-0.1146	0.0579
TAX	-0.0228	0.0280	-0.8100	0.4160	-0.0778	0.0322
DEPR	0.3970	0.2217	1.7900	0.0740	-0.0381	0.8320
INDLEV	0.0966	0.0596	1.6200	0.1060	-0.0205	0.2136
INDCL	0.0232	0.0135	1.7200	0.0860	-0.0033	0.0497
INDCL1	0.0248	0.0181	1.3700	0.1710	-0.0107	0.0603
INDCL2	0.1947	0.0372	5.2400	0.0000	0.1217	0.2676
INDCL3	0.0544	0.0168	3.2300	0.0010	0.0214	0.0875
INDCL4	0.0225	0.0177	1.2700	0.2040	-0.0122	0.0572
INDCL5	-0.0090	0.0224	-0.4000	0.6880	-0.0530	0.0350
STOCKMRT	0.0392	0.0394	0.9900	0.3200	-0.0382	0.1166
LENDRT	-0.1357	0.2783	-0.4900	0.6260	-0.6818	0.4104
INFLATION	0.5903	0.2080	2.8400	0.0050	0.1821	0.9986
_cons	-0.6403	0.0805	-7.9500	0.0000	-0.7983	-0.4823

Appendix 20: Pooled OLS regression with LDC and all factors

Source	SS	df	MS	Number of obs	=	915
				F(19, 895)	=	53.01
Model	13.26058	19	0.697925	Prob > F	=	0
Residual	11.78264	895	0.013165	R-squared	=	0.5295
				Adj R-squared	=	0.5195
Total	25.04322	914	0.0274	Root MSE	=	0.11474

LDC	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
RISK	-0.0153	0.1490	-0.1000	0.9180	-0.3076	0.2771
ROA	-0.4459	0.0706	-6.3100	0.0000	-0.5845	-0.3072
SIZE	0.1002	0.0076	13.1200	0.0000	0.0852	0.1152
GROWTH	-0.0029	0.0122	-0.2400	0.8110	-0.0269	0.0210
CAPEX	0.0700	0.0457	1.5300	0.1260	-0.0197	0.1597
TANG	0.3655	0.0246	14.8900	0.0000	0.3173	0.4137
SGA	-0.0093	0.0367	-0.2500	0.8010	-0.0814	0.0629
TAX	-0.0172	0.0234	-0.7300	0.4640	-0.0632	0.0288
DEPR	0.1768	0.1854	0.9500	0.3410	-0.1871	0.5406
INDLEV	0.0712	0.0499	1.4300	0.1540	-0.0268	0.1691
INDCL	0.0179	0.0113	**1.5800**	**0.1140**	-0.0043	0.0400
INDCL1	0.0231	0.0151	**1.5200**	**0.1280**	-0.0066	0.0528
INDCL2	0.1585	0.0311	**5.1000**	**0.0000**	0.0975	0.2195
INDCL3	0.0470	0.0141	**3.3300**	**0.0010**	0.0193	0.0746
INDCL4	0.0197	0.0148	**1.3300**	**0.1840**	-0.0094	0.0487
INDCL5	-0.0123	0.0188	**-0.6600**	**0.5110**	-0.0492	0.0245
STOCKMRT	0.0305	0.0330	0.9300	0.3550	-0.0342	0.0953
LENDRT	-0.4528	0.2327	-1.9500	0.0520	-0.9096	0.0040
INFLATION	0.4557	0.1740	2.6200	0.0090	0.1142	0.7971
_cons	-0.5924	0.0673	-8.8000	0.0000	-0.7245	-0.4602