University of Strathclyde

Department of Accounting and Finance

Corporate Investment, Capital Structure and (Reversed) Debt Overhang: A Comparative Analysis of Chinese, U.S., and Global Markets

Jiasheng Guo

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Declaration

‘This thesis is the result of the author’s original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.’

Signed: Jiasheng Guo

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Abstract

This thesis primarily focuses on examining capital structure and the concept of (reversed) debt overhang. In Chapter 2, we delve into an analysis of financial data from Chinese listed companies from 2000 to 2018. This investigation assesses the relevance of the pecking order theory and begins a preliminary exploration into the impact of debt overhang on future investments. Our findings challenge the traditional pecking order theory for Chinese firms, highlighting their preference to treat long-term debt as a financing method of last resort. Significantly, short-term debt comprises a major portion of their debt structure and negatively influences future investments. While long-term debt generally shows little effect on future investments in Chinese companies, it exhibits a notable negative impact when future investments are measured using the net investment ratio. Our research also does not establish a significant link between intangible assets and leverage levels.

Chapter 3 explores the relationship between future investment levels and debt structure choices in U.S. listed companies, excluding sectors like finance, banking, insurance, utilities, and government. We employ a cross-sectional model to evaluate predictors of future investment levels, such as Tobin's q, cash flow, and ROE. Our analysis reveals a positive and significant influence of these factors on debt structure decisions, especially regarding short-term debt. However, we observe no significant impact on long-term debt issuance. The study also distinguishes between expansion and recession periods, noting the positive influence of expected investment factors on debt issuance during expansions, with a reversal of this trend during recessions. Additionally, a firm's growth factor has a negative effect on debt issuance during expansion periods but a positive effect during recessions.

Chapter 4 focus on the complex interplay between debt overhang, expected investment,

and liquidity, crucial elements in defining a firm's financial health and strategic decision-making. The chapter examines how existing debt, or debt overhang, can impede a firm's ability to initiate new projects or obtain further funding, particularly under financial stress. Utilizing Compustat fundamental annual data from North American (referred to as US-listed in this study) and Global listed firms from 1987 to 2022, the research introduces an innovative approach. It proposes the creation of a q-factor based on liquidity indicators to assess expected investment levels and their effect on short-term and long-term debt overhang. For US-listed firms, the results show that liquidity positively influences capital expenditure in both short and long terms. In contrast, for Global firms, liquidity adversely affects short-term investment but positively impacts long-term investment. In terms of expected investment, for US-listed firms, it negatively impacts short-term debt but positively influences long-term debt. However, for Global firms, no significant effect on debt overhang is observed.

Catalogue

Chapter1. Introduction

1.1 overview of capital structure and debt overhang

The development and evolution of capital structure theories have been a central theme in finance, reflecting a complex interplay of various factors, including financial market dynamics, investor behavior, and macroeconomic conditions. These theories have progressed significantly since the seminal work of Modigliani and Miller in 1958, which proposed the irrelevance of capital structure in perfect markets. This revolutionary concept challenged traditional views, suggesting that under certain conditions, the value of a firm is unaffected by its debt-equity mix. However, the real world is replete with market imperfections, leading to significant adaptations of this theory. Subsequent developments in capital structure theory have incorporated these imperfections, recognizing the pivotal role of debt, particularly in exploiting tax shields. Debt financing offers tax advantages because interest payments are tax-deductible, reducing the company's taxable income. This aspect of debt financing has led to a reevaluation of the irrelevance theorem, acknowledging that under real-world conditions, capital structure does matter.

Academic research has played a crucial role in this evolution, integrating diverse concepts like agency costs, signaling theory, and pecking order theory. Agency costs arise from the conflicts of interest between company managers (agents) and shareholders (principals). Managers might not always act in the shareholders' best interests, leading to inefficiencies and increased costs. Signaling theory, on the other hand, relates to how companies convey information to the market. A firm's choice between debt and equity financing can signal its confidence in prospects; for example, a company that opts for debt might be signaling its expectation of high future cash flows. Pecking order theory suggests that companies prefer internal financing over

external financing and debt over equity if external financing is required. This preference is driven by the costs of adverse selection and asymmetric information between corporate insiders and the market.

From a macroeconomic perspective, factors such as interest rates, economic cycles, and government policies play a significant role in shaping corporate capital structures. Interest rates, for instance, directly affect the cost of debt, with lower rates making debt financing more attractive. Economic cycles influence corporate earnings and investment opportunities, which in turn impact leverage decisions. During economic downturns, companies might reduce debt to decrease bankruptcy risk, whereas in growth phases, they might take on more debt to finance expansion. Government policies, including tax laws and regulations, can also significantly influence capital structure decisions.

The corporate financing angle offers a more granular view, exploring how firms balance debt and equity. This balance is influenced by several factors, including the cost of capital, financial flexibility, and corporate strategy. The cost of capital represents the firm's cost of financing and is a crucial factor in investment decisions. Financial flexibility refers to the ability of a firm to raise capital under different market conditions, which is vital for long-term sustainability. Corporate strategy, including growth plans and risk management, also plays a significant role in determining the optimal capital structure.

The trade-off theory in corporate finance provides a framework for understanding how companies balance the benefits and costs of debt. This theory posits that firms weigh the tax benefits of debt against the potential costs of financial distress, including bankruptcy. While debt can provide a tax shield, excessive debt increases the risk of financial distress, which can be costly and disruptive to operations.

Environmental, Social, and Governance (ESG) factors are increasingly recognized as significant in capital structure decisions. As societal awareness and investor preferences shift towards sustainability and ethical practices, companies are being evaluated not just on financial metrics but also on their impact on the environment, their social responsibility, and governance standards. This shift has led to a growing recognition that ESG factors can influence a company's risk profile and, consequently, its capital structure. Investors and stakeholders are increasingly factoring in ESG considerations, affecting both the cost of capital and the investment decisions of firms.

In the global context, understanding capital structures and debt issues in key markets like China and the United States is crucial. The capital structure of a firm significantly influences its risk profile and, thus, the decisions of various stakeholders, including investors, creditors, and policymakers. The interconnectedness of global markets means that capital structure decisions in one region can have far-reaching effects, as evidenced by the 2008 financial crisis, which originated in the U.S. housing market and quickly spread globally. Investors looking to diversify internationally need to understand how capital structures vary across regions, as these differences can significantly impact investment returns and risks.

Chinese firms, for instance, may exhibit different capital structures compared to U.S. firms, influenced by factors such as different regulatory environments, market conditions, and cultural aspects of corporate governance. These differences necessitate a nuanced understanding of the underlying factors shaping capital structures in various markets. For example, the debt management strategies of firms can reflect broader economic trends and government policies, providing insights into the overall health and direction of the economy.

Liquidity, expected investment, and debt issuance are critical components of a firm's capital structure. Liquidity, defined as the availability of cash and assets that can be quickly converted to cash, is essential for a firm's operational and financial flexibility. High liquidity can reduce the need for external financing, while low liquidity may compel firms to seek debt. Expected investment, which refers to the anticipated expenditures for growth and operations, is a key driver in the decision to issue debt. Firms with significant future investment needs, especially those with inadequate internal funds, might opt for debt financing. However, this decision is contingent on the overall financial strategy of the firm, prevailing market conditions, and the relative costs of different financing options. The complex interplay between these factors underscores the dynamic nature of capital structure decisions. Firms must constantly reassess their financing strategies in response to internal and external changes, striking a balance that supports their long-term goals while managing risk.

This thesis provides an in-depth analysis of capital structures and debt overhang issues in Chinese, U.S., and global listed firms, offering a comprehensive view of corporate financial strategies in these diverse markets. By examining theories like Modigliani and Miller's irrelevancy theory, the trade-off theory, and Myers and Majluf's pecking order theory, the thesis contextualizes these frameworks within various market scenarios. The Chinese section delves into the unique capital structure of Chinese firms, exploring how profitability and debt impact investments. The U.S. section investigates the relationship between leverage, investment, and economic cycles in the dynamic American market. Finally, the global perspective integrates these concepts, focusing on debt overhang, liquidity, and investment decisions across different economic conditions. The thesis methodically structures this analysis, blending theoretical frameworks with empirical findings, to provide a nuanced understanding of how capital structures are shaped by a complex array of factors, including market conditions, regulatory environments, and cultural influences.

1.2 Investigation on Chinese market

In the past few decades, there has been a surge in research exploring capital structure decisions from both theoretical and empirical perspectives. A notable theory in this field is the trade-off theory, which posits that companies seek an optimal balance between the tax benefits of debt and the risks of bankruptcy. Contrasting this, Myers and Majluf (1984) proposes a hierarchy for financing options. It suggests that firms prefer internal financing over external, prioritizing debt over equity, which is seen as a last resort. This theory was substantiated by Sunder and Myers (1999) through their research on U.S. companies. However, Frank and Goyal (2003) questioned its applicability, particularly for small to medium-sized U.S. firms in the post-1980s era. Moreover, the theory tends to undervalue equity financing, which, in contradiction to the theory, is a substantial component of the capital structure in Chinese companies.

Myers (1977) connected capital structure choices with future investment decisions, indicating that high leverage might result in a 'debt overhang' that negatively impacts future investments. He advocated for the use of short-term debt to mitigate this, a stance that was later challenged by Diamond and He in 2014 due to the potential financial stress it could cause. While research supports Myers' view on the adverse effects of long-term debt, as evidenced by studies from Lang, Ofek, and Stulz (1996), Aivazian, Ge, and Qiu (2005), and Cai and Zhang (2011), these studies predominantly focus on developed markets and less so on the debt influence in Chinese firms.

Given the emerging market status of China, understanding the unique capital structure of Chinese firms is essential. Despite extensive research on leverage determinants in Chinese companies, there is a scarcity of studies applying the pecking order theory in this context. This study seeks to address three main questions regarding the capital structures of Chinese firms: their adherence to the pecking order theory, the primary

factors shaping their capital structures, and the influence of both long and short-term debt on future investments.

Employing panel data methodology and testing through fixed and random effect models, this study reveals that both the pecking order and trade-off theories have limited explanatory power for Chinese firms. It emerges that profitability is the most significant factor influencing capital structure across diverse types of firms. The role of asymmetric information remains ambiguous, contributing to the pecking order theory's limited applicability in China. Notably, while long-term debt does not substantially impact future investments, short-term debt exerts a significant negative influence, especially on manufacturing companies. Additionally, long-term debt is often the last resort for financing in these firms.

This chapter significantly enhances our understanding of the capital structures of Chinese firms. It challenges the conventional efficacy of the pecking order theory in China, aligning with previous research that underscores profitability as a key determinant. However, it diverges by underscoring the positive effect of asset tangibility on debt levels in IT and technology firms, and a slightly negative impact on long-term debt in manufacturing firms, a finding distinct from prior studies in the Chinese context. Moreover, this research sheds light on the role of short-term debt in capital structures and its influence on future investments, an aspect less examined in existing literature.

1.3 Investigation on US market

The second chapter explore the relationship between a firm's leverage ratios and the shifts in its anticipated investment levels, situated against the dynamic and complex backdrop of the U.S. business environment. This setting is defined by its competitive

markets, a strong emphasis on innovation, and a well-established financial system, making it a fertile ground for diverse and evolving financial strategies. The U.S. economy, with its cycles of growth and recession, plays a pivotal role in shaping the financial health of corporations. Economic downturns, such as the 2008 financial crisis and the recent COVID-19 pandemic, typically result in tighter credit markets, reduced consumer spending, and a general atmosphere of economic uncertainty. In contrast, periods of economic growth are characterized by increased consumer confidence, heightened investments, and greater access to credit, all of which directly influence how corporations manage their debt and investment decisions, thereby setting the stage for firms to fine-tune their leverage and capital allocation strategies.

In this landscape, the concept of 'debt overhang' emerges as a significant challenge for many U.S. firms. This phenomenon occurs when a company's existing debt is so substantial that any new profits or external funding is largely dedicated to servicing this debt, thus severely restricting the ability to finance new investments. This issue is particularly acute in sectors where rapid technological changes and intense competition necessitate continuous investment, limiting a firm's ability to pursue new projects or adopt cutting-edge technologies, even when these ventures are potentially lucrative.

The anticipated investment level of a firm is influenced by a myriad of factors, including the overall economic climate, industry-specific dynamics, regulatory environment, strategic goals, and global trends. Internal factors such as a firm's risk tolerance, financial health, and long-term strategic goals are crucial in understanding investment projections. Firms with strong balance sheets and substantial cash reserves tend to be more inclined towards pursuing growth opportunities, while those under financial constraints may focus on efficiency and cost reduction. This strategic orientation, whether aimed at market expansion, diversification, or consolidation,

plays a vital role in investment decision-making.

Echoing the insights of Aygunes (2017), macroeconomic indicators such as GDP growth, interest rates, inflation, and employment rates also significantly sway investment decisions. In times of economic expansion, firms often adopt an aggressive investment posture, driven by increased consumer demand, improved profits, and easier access to capital. Conversely, in periods of economic downturn, a more cautious strategy is adopted, focusing on balance sheet strength and cash flow conservation.

Building on Myers' (1977) work, the chapter discusses how high leverage can lead to a 'debt overhang', exacerbating financial stress and diminishing a firm's ability to invest in the future. Myers advocated the use of short-term debt as a remedy to mitigate the negative effects of debt overhang on investment potential. However, this view was later contested by Diamond and He (2014), who argued that short-term debt could significantly intensify financial pressure over a short period, potentially impairing a firm's capacity for future investments. The second chapter is dedicated to substantiating Myers' (1977) hypotheses, with a particular emphasis on the implications of long-term debt. It aims to build upon the foundation laid by preceding studies, such as those conducted by Lang, Ofek, and Stulz (1996), Aivazian, Ge, and Qiu (2005), and Cai and Zhang (2011), which have consistently unveiled a negative relationship between long-term debt and the prospects for future investments. These findings have been pivotal in shaping the current understanding of how debt overhang can affect a firm's investment activities. However, there is a notable gap in the existing body of research, particularly regarding the reciprocal influence of anticipated investment activities on a company's existing debt structure.

Moreover, the chapter seeks to explore the often-overlooked aspect of how economic cycles impact capital structure decisions. While it's acknowledged that economic

conditions play a significant role in shaping corporate strategies, there is a lack of comprehensive analysis on how fluctuations in the economy, such as periods of growth or recession, directly affect a firm's decisions regarding debt, especially long-term obligations. This exploration is crucial, as it could provide insights into whether firms adjust their leverage in response to economic forecasts, and if so, how these adjustments manifest across different economic cycles. To address these gaps, this chapter employs a multifaceted empirical approach. It not only revisits the established negative correlation between long-term debt and future investment decisions but also ventures into the less charted territory of how anticipated investments might sway current debt levels. By analyzing data over several economic cycles, the chapter aims to shed light on whether and how firms adjust their capital structures in anticipation of economic downturns or upswings. This analysis is particularly relevant in the context of the recent global economic upheavals, such as the financial crisis of 2008 and the COVID-19 pandemic, which have drastically altered the economic landscape and, by extension, corporate financial strategies. Through a comprehensive review of existing literature and a detailed examination of new empirical data, this chapter seeks to provide a more nuanced understanding of the interplay between long-term debt, investment decisions, and economic cycles.

1.4 Investigation on US and Global market

The third chapter undertakes a comparative analysis between global markets and those specific to North America, with a focus on examining the interrelationships among liquidity, the expected return factor, and debt overhang. These three elements - debt overhang, liquidity, and investment levels - are crucial for comprehending a firm's financial health and strategic decision-making processes. Debt overhang is a fundamental concept in corporate finance, denoting a scenario where a company's existing debt significantly hinders its ability to embark on new ventures or secure

additional funding. This issue becomes especially pertinent during times of financial strain or economic recessions, where it can greatly influence a firm's growth trajectory and operational strategies. The discussion of debt overhang has evolved substantially in financial literature, having originated from broader debates on capital structure and its effects on firm value. More recently, the emphasis has shifted towards exploring how excessive debt can act as a barrier to future investment and growth. previous studies, such as those by Myers (1997) and He (2014), have been instrumental in advancing our understanding of these dynamics. In addition to debt overhang, liquidity plays a significant role in a firm's financial operations. Liquidity, or the ease with which assets can be converted to cash without significant loss in value, is critical for maintaining operational flexibility and responding to unforeseen opportunities or challenges.

The phenomenon of debt overhang is not exclusively a concern for large corporations. Small businesses, often seen as the backbone of innovation and economic growth, can also be acutely affected by high levels of debt. For these smaller entities, excessive debt can hinder their ability to innovate, expand, and respond to market opportunities. This is particularly challenging for small businesses, which typically have less access to diverse funding sources and may rely more heavily on debt financing for their operations and growth initiatives. To thoroughly understand the implications of debt overhang, it's imperative to examine its effects across various types of organizations. This includes not only differentiating between large corporations and small businesses but also considering the sector-specific impacts and the unique financial structures within different industries. For instance, industries that require substantial upfront capital investment, such as manufacturing or biotechnology, might experience the effects of debt overhang more profoundly compared to sectors with lower capital intensity.

Investment decisions are fundamental to the strategic trajectory of any firm, having profound implications for growth, profitability, and long-term viability. These decisions encompass crucial choices about whether to invest, the scale of investment, and the specific avenues for investment. They are shaped by a complex interplay of internal and external factors, ranging from the firm's financial standing to the overarching economic environment. The Modigliani-Miller theorem offers an essential theoretical framework in understanding the relationship between a firm's financing decisions and its value. This theorem posits that under certain idealized conditions, the value of a firm is unaffected by its capital structure. However, in practical scenarios, real-world complexities such as taxation, bankruptcy costs, and market imperfections significantly influence investment decisions, leading to departures from the theorem’s idealized scenarios.

Jones and Smith (1982) propose a critical concept in investment decision-making is the Net Present Value (NPV). NPV is a financial metric used to assess the profitability of an investment by calculating the present value of its expected future cash flows. The underlying principle of the NPV rule is that investments should be pursued if they yield a positive NPV, signifying that they are expected to produce value exceeding their cost. This criterion allows firms to evaluate potential investments objectively, prioritizing those that are most likely to enhance long-term value.

The primary impact of debt overhang on a firm's investment strategy is notably characterized by the underinvestment problem, as highlighted by Myers (1977), Lang (1996), and Diamond and He (2014). Firms encumbered with substantial debt levels often exhibit hesitancy in pursuing new projects, even those with promising net present values (NPVs). The underlying rationale is straightforward yet impactful: the returns from such investments are likely to be predominantly allocated to servicing existing debts. This leaves minimal, if any, benefits for equity holders, who shoulder the risks

associated with these investments. As a result, this leads to a scenario where potentially lucrative opportunities are bypassed, thereby hampering innovation and curtailing growth. This theoretical framework is substantiated by empirical evidence. Lang's (1996) research, for instance, demonstrates that firms with high leverage ratios are inclined to invest less in growth opportunities compared to their counterparts with lower debt levels. This trend becomes more pronounced in sectors that demand significant capital investment or in market conditions where capital access is constrained. Furthermore, the broader economic climate plays a crucial role in either exacerbating or mitigating the effects of debt overhang on investment decisions. During times of economic downturns, the challenges posed by debt overhang intensify. Firms may struggle to service their debts amidst declining revenues, leading to more pronounced constraints on their investment capacities. In contrast, during periods of economic prosperity, the resultant increase in cash flow can alleviate some of the debt burden, offering a reprieve from the underinvestment issues typically associated with debt overhang.

In terms of corporate finance, the significance of liquidity cannot be overstated. It serves as a crucial barometer of a firm's operational and strategic adaptability. Liquidity, or the ability of a firm to promptly meet its short-term obligations such as accounts payable, acts as a safeguard against the perils of financial distress. The Modigliani and Miller theory on capital structure illuminates this point, positing that although debt may present a cost-effective financing option due to tax benefits, elevated debt levels invariably escalate financial risk. Consequently, maintaining robust liquidity becomes imperative for firms to effectively counterbalance these risks.

The critical role of liquidity was starkly highlighted during the 2009 Financial Crisis, which affected not only the financial markets but the broader global economy as well. The aftermath of the crisis, particularly post-2008, led to the implementation of more

stringent liquidity requirements as part of the Basel III accord. Basel III, a comprehensive set of international banking regulations developed by the Basel Committee on Banking Supervision, was formulated in direct response to the regulatory shortcomings exposed by the financial crisis of 2007-2008. By introducing these liquidity requirements, Basel III aims to mitigate the risks associated with insufficient liquidity levels, a critical lesson learned from the financial crisis.

This chapter represents a significant contribution to the field by examining the interplay between debt overhang and liquidity, with a focus on both North American and global markets. Specifically, the study endeavors to develop a quantifiable 'q-factor' related to the expected investment level of firms, grounded in the liquidity indicators of these entities. This endeavor involves an in-depth exploration of how liquidity, as a measure of a firm's ability to quickly convert assets into cash, influences its capacity to invest, especially under the constraints of debt overhang. In doing so, the chapter provides a deep understanding of how firms in different markets - with particular emphasis on the variances between North American and global markets - navigate the challenges posed by debt overhang. By analyzing liquidity as a key factor, the study sheds light on the strategic decisions firms makes regarding investments, especially when they are operating under significant debt burdens.

1.5 Research questions

Chinese Chapter:

This chapter mainly addresses three pivotal aspects of corporate finance within the context of Chinese firms

1. The adherence of Chinese firm to the pecking order theory. The investigation into

Chinese firms' adherence to this theory is crucial, as it offers insights into whether and how the financial behavior of these firms aligns with established financial theories.

2. Based on the Method of Sunders (1999) the primary determinants of Chinese capital structures. This analysis is particularly significant given the unique economic and regulatory environment in China, which may influence corporate capital structure decisions differently compared to Western contexts.

3. The impact of long and short-term debt on future investments of Chinese firms. The analysis differentiates between the impacts of short-term and long-term debt, providing a deep view of how each type of debt influences the investment behavior of Chinese firms.

North-America Chapter.

1. Identifying the factors that drive expected investment levels. This objective focuses on identifying and analyzing the key determinants that influence expected investment levels in North American firms.

2. Investigating the influence of expected investment on a firm’s debt overhang. This part investigates how a firm’s anticipations of future investments affect its current debt overhang, examining the interplay between investment forecasts and financial liabilities.

3. Examining the relationship between debt overhang and economic cycle. This

section intends to scrutinize the relationship between a firm’s debt overhang and the business cycle. The goal is to understand how the cycle of economic growth and contraction affects, and is affected by, the firm's level of debt relative to its equity.

Global vs North-America Chapter

1. Analyzing Liquidity Indicators and Their Impact on Investment Expectations. This objective focuses on examining and identifying reliable liquidity indicators that influence expected investment factors. The aim is to determine how these indicators vary and what their implications are for investment strategies in different markets.

2. Contrasting Debt Overhang in Global and North American Markets. The goal here is to conduct a comparative analysis of the debt overhang outcomes in global markets versus those in North America. This involves assessing how debt overhang varies between these markets and understanding the underlying reasons for any differences observed.

1.6 Main Findings

The second chapter's findings indicate a deviation from the traditional pecking order theory in the context of Chinese firms, with long-term debt being a less preferred financing option. Short-term debt, comprising a substantial part of their debt structure, appears to adversely affect future investments. Contrarily, long-term debt does not generally have a significant influence on future investments in these firms. However, a notable exception is observed when future investments are measured by the net

investment ratio, where long-term debt does have a significant and negative impact. Furthermore, the study reveals no significant correlation between intangible assets and the level of leverage.

The third chapter reveals that future investment levels exert a positive influence on long-term debt, with short-term debt also being positively affected. Additionally, it is observed that firms with high growth opportunities are less susceptible to the impacts of future investment levels. Moreover, the influence of future investments on long-term debt remains positive across both expansion and recession cycles. In contrast, short-term debt demonstrates a negative relationship with investment levels, but only during periods of recession.

In the fourth chapter, the results pertaining to U.S.-listed firms reveal that liquidity has a favorable impact on capital expenditure in both the short and long term. On the other hand, for global firms, liquidity is found to have a detrimental effect on short-term investment, yet it exerts a positive influence in the long term. Concerning expected investment, U.S.-listed firms experience a negative effect on short-term debt but a positive impact on long-term debt. However, for global firms, no significant impact of expected investment on debt overhang was detected.

1.7 Thesis Structure

This thesis comprises five self-contained chapters. Chapter 1 sets the stage by introducing the overarching context, key research inquiries, and a synopsis of the main findings from the next three empirical chapters (Chapters 2 – 4). Each empirical chapter follows a consistent structure that includes an introduction, literature review, identification of literature gaps, descriptive statistics, methodologies, results, implications, and a conclusion. Chapter 5 culminates the thesis by presenting

conclusions and business implications derived from the findings of the empirical chapters.

In Chapter 2, titled “Pecking Order Theory of Capital Structure and Impact of Leverage on Future Investments: Chinese Evidence,” the literature review delves into the pecking order theory, capital structure, and the concept of debt overhang. This chapter evaluates the validity of the pecking order theory in Chinese firms and examines the influence of debt overhang on their investment incentives. The findings from the panel random effect regression analysis are concisely summarized in the final section. Chapter 3, “Reversed Debt Overhang? The Impact of Expected Future Investment on Debt Structures,” begins its literature review by exploring debt overhang, investment patterns, and predictors of expected investment factors. In Chapter 4, “Reversed Debt Overhang of Global Markets: Liquidity, Investment, and Debt Overhang,” the literature review is centered on the influence of liquidity on expected investment factors and extends to the impact of liquidity on the debt overhang in both global and U.S. firms.

Chapter 2

Pecking order theory of capital structure and impact of leverage on future investments: Chinese evidence

Abstract

Using the Chinese listed firm's financial data for 2000 to 2018, we test the effectiveness of pecking order theory and develop a preliminary work to discover the impacts of debt overhang on future investments. The results suggest that the traditional pecking order theory is not valid on Chinese firms, as long-term debt is their last financing choice. Short-term debt accounted for a significant portion of the debt structure and indeed negatively impact future investments. On the whole, long-term debt does not seem to significantly impact future investments for Chinese companies; however, it significantly and negatively impacts future investments when the future investments proxied by net investment ratio. Additionally, we do not find a significant relationship between intangible assets and leverage level.

Key words: Capital Structure, Pecking order theory, Debt overhang, Long-term debt, Short-term debt, Future investments.

2.1 Introduction

Since Modigliani and Miller's irrelevancy theory in 1958, understanding the capital structure decisions of firms has posed a significant challenge to finance researchers. The irrelevancy theory suggests that in a perfect capital market, where information is universally accessible and the interest rates for borrowing and lending are identical for firms and individual investors, asymmetric information costs like transaction and bankruptcy costs do not exist. However, these assumptions, while theoretically sound, are impractically idealistic.

Over recent decades, numerous studies have explored capital structure decisions both theoretically and empirically. One prominent theory is the trade-off theory, which posits that firms balance tax shield benefits and bankruptcy costs to reach an optimal debt level. In contrast, Myers and Majluf's pecking order theory (1984) ranks firms' funding sources, prioritizing internal funding, followed by debt and equity as a last resort. While Sunder and Myers (1999) validated this theory through empirical research on U.S. firms, Frank and Goyal (2003) challenged its dominance, particularly for small and medium-sized U.S. firms post-1980s. This theory also underplays equity finance, which, contrary to the theory, forms a significant part of the capital structure in Chinese firms.

Myers (1977) linked capital structure decisions with future investments, suggesting that increased leverage could lead to a 'debt overhang,' adversely affecting future investments. Myers recommended short-term debt to mitigate this issue, a view contested by Diamond and He (2014) due to the acute financial pressure it could create. Research supports Myers' stance regarding long-term debt, with studies like Lang, Ofek, and Stulz (1996), Aivazian, Ge, and Qiu (2005), and Cai and Zhang (2011) showing a negative relationship between long-term debt and future investments.

However, these studies primarily focus on developed markets, with limited research on the influence of debt in Chinese firms.

As a major emerging market, understanding the capital structure of Chinese firms, distinct in their characteristics, is crucial. While extensive research has examined leverage determinants in Chinese companies, few have applied the pecking order theory to this context. This study aims to answer three key questions about the capital structures of Chinese firms: their adherence to the pecking order theory, the primary determinants of their capital structures, and the impact of long and short-term debt on future investments.

Utilizing panel data methodology and testing through fixed and random effect models, the study finds that both the pecking order and trade-off theories have limited explanatory power for Chinese firms. Profitability emerges as the most influential determinant of capital structure across various firm types. The impact of asymmetric information remains unclear, another factor contributing to the failure of the pecking order test in China. Interestingly, while long-term debt does not significantly affect future investments, short-term debt has a considerable negative impact, particularly on manufacturing firms. Furthermore, long-term debt is often the last financing option for these firms.

This paper contributes uniquely to the understanding of Chinese firms' capital structures. It challenges the traditional effectiveness of the pecking order theory in China, aligning with prior studies that emphasize profitability as a crucial determinant. However, it diverges by highlighting the positive influence of tangibility on IT and technology firms' debt levels and its slightly negative impact on manufacturing firms' long-term debt. This perspective is notably distinct from previous Chinese studies. Additionally, this study focuses on the role of short-term debt in capital structures and

its impact on future investments, an aspect less explored in prior research.

The paper is organized into six sections: a literature review of capital structure theory and debt overhang; an explanation of the models and assumptions used in the research; a description of the data collection process; a discussion of the empirical findings; and a conclusion with suggestions for future research.

2.2 Literature Review

Myers and Majluf's (1984) theory suggest that firms prioritize their financing sources in a hierarchical manner, primarily due to the presence of asymmetric information between the company's insiders and outside investors. This hierarchy is established with the intent to minimize various costs and risks associated with raising capital.

At the top of this hierarchy is internal funding. The primary advantage of utilizing internal funds is the avoidance of transaction costs and the elimination of asymmetric information costs. Since internal funds are generated within the firm, there is no need for external disclosures or negotiations that might expose the firm to information disparities or additional costs. However, when internal funding is not adequate to meet the firm’s financial needs, the theory suggests that firms should next consider debt financing. This is subdivided into two categories: riskless and risky debt. Riskless debt is preferred over risky debt due to its lower interest rates and reduced potential for volatility. It is perceived as safer by investors, who, aware of the asymmetric information, often demand higher returns to compensate for perceived risks. This demand for higher returns can lead to increased volatility in the firm's financials, which firms naturally aim to avoid. The tax implications of debt also play a significant role in this hierarchy. Debt financing allows firms to shield some of their income from taxes through interest deductions, which can make debt a more attractive option than

equity, at least from a tax perspective. Finally, at the bottom of the hierarchy is equity financing. Firms resort to equity only when other sources are exhausted or deemed unsuitable. This is largely due to the higher costs associated with issuing new equity, including underwriting fees, the dilution of existing shareholders' stakes, and the potential for greater volatility brought about by the introduction of new shareholders who may have different expectations and levels of understanding of the firm's operations. Equity investors, aware of the asymmetric information, might demand a higher return to mitigate their risk, which can further disincentivize firms from opting for equity as a primary source of financing.

The paper by Shyam-Sunder and Myers (1999) conducts a comparative analysis of the static trade-off and pecking order models of capital structure. It challenges the conventional understanding of optimal capital structure by testing these models against each other. The research demonstrates that the pecking order model, which suggests that firms prioritize internal funding and safer debts over riskier financing options, has greater explanatory power than the static trade-off model, which posits that firms aim for an optimal debt ratio balancing tax shields and financial distress costs. The study's methodology includes robust statistical tests and utilizes a sample of mature public firms. The findings significantly contribute to the understanding of corporate financing behavior, particularly highlighting the limited applicability of the static trade-off theory in explaining real-world capital structures.

Frank and Goyal's (2003) research challenges the findings of the pecking order theory by analyzing U.S. non-financial listed firms. They discovered that firms with financing deficits tend to issue equity rather than debt, a trend more pronounced in small to medium-sized firms. While larger firms exhibited some pecking order behaviors, the significance of debt financing diminished over time. The study also explored the impact of various factors on leverage levels, finding a negative correlation with

profitability and growth ratio, and a positive correlation with tangibility and sales. Fama and French (2005) argue that equity issues are definitely not the last resort for most of the US-listed firms. It seems that stock issuing to employees, right issues, or direct purchase plan could avoid both transaction costs and asymmetric information problems to large extent. Lemmon and Zender (2002) provide empirical research to support the validity of pecking order test. However, contract to the Myers and Majluf (1984), they indicate those small-medium size firms with high growth opportunities tend to issue equity financing than debt, due to the restricted debt capacity. Debt is the primary external funding choice for large and mature firms. Leary and Roberts (2004) conducted an empirical examination of the pecking order model, suggesting complexities in classifying debt and equity issuance due to debt capacity concerns and leverage targeting. Their study also found no significant link between asymmetric information and pecking order behavior. Overall, the existing empirical results suggest the pecking order theory is highly controversial.

Beyond the literature focusing specifically on pecking order theory, a breadth of research has delved into the determinants shaping firms' capital structures. A study by Harris and Raviv in 1991 highlights a critical vulnerability: firms with limited tangible assets are often more exposed to asymmetric information, compelling them to increase their debt financing. This theme of asymmetric information is further explored in various studies, each adding nuance to our understanding of corporate finance strategies.

In a notable early work, Chen (2003) study meticulously examines Chinese listed firms from 1995-2000. His findings are revealing: long-term debt in these firms is significantly influenced by factors like profitability, growth opportunities, asset tangibility, and book value. Chen's analysis also suggests a unique pecking order among Chinese firms, distinct from the model proposed by Myers and Majluf in 1984.

According to Chen, Chinese firms prioritize retained profits, followed by equity issuance, with long-term debt being a last resort. Interestingly, these firms demonstrate a preference for short-term financing over long-term debt.

Building on this, Bharath, Pasquariello, and Wu's 2008 study underscores the substantial role of asymmetric information in explaining the link between debt issues and financial deficits. Frank and Goyal in 2009 further contribute to this discourse by observing that larger firms, particularly those with substantial tangible assets, tend to exhibit higher leverage. Conversely, firms with high profits and growth opportunities generally show lower leverage levels. Chang and Chen’s 2014 research employs the BIC model to assess potential capital structure determinants in Chinese listed firms. Their findings indicate a dependency of firms’ debt financing decisions on their financial health. Firms grappling with low profitability or those in rapid growth phases, requiring significant cash, are more inclined to issue debt. Finally, Mustaruddin et al.'s 2017 study takes a closer look at the impact of asymmetric information on capital structure decisions. Their analysis, using the Amihud ratio as a measure, reveals a negligible connection between asymmetric information and leverage. However, they find a significant and negative correlation when asymmetric information is represented by firm size, adding a new dimension to the understanding of capital structure dynamics.

Modigliani and Miller (1963) posits that the investment policy of firms is primarily driven by the profitability of investment opportunities, rendering future investments and leverage fundamentally unrelated. This groundbreaking idea, however, has been met with considerable scrutiny and opposition in later studies. A significant challenge to this theory comes from Myers in 1977, who suggests that the issuance of risky debt could substantially diminish both the market value of a firm and its growth opportunities. This perspective introduces the concept that debt can have a detrimental

effect on a company's potential for expansion and success. Building on this critique, Jansen in 1986 and Stultz in 1990 highlight the underinvestment issue that can arise from debt issuance. They argue that cash flows, which should ideally be allocated for investment, are instead diverted to service debt, forcing management to forgo valuable investment opportunities. This scenario creates a complex dynamic where the firm's growth and innovation potential are stifled due to financial obligations.

Interestingly, this restriction on cash flow can sometimes have a silver lining. It can prevent managers from engaging in unprofitable investment projects that would otherwise harm shareholder welfare. This aspect adds a nuanced understanding of the role of debt in corporate governance. Further adding to this discourse, McConnell and Servaes in 1995 categorize listed US firms into two groups based on Tobin’s Q ratio: those with high and low values. Their findings indicate that while leverage negatively impacts the value of firms with high growth opportunities, it can positively influence firms with lower growth prospects. This dichotomy underscores the dual nature of debt: it can both induce underinvestment in high-potential firms and mitigate overinvestment in others. Lang and Ofek in 1996 conduct empirical research on US companies, uncovering a negative relationship between leverage and growth. However, they find this association to be significant only for firms with low Tobin's Q. This suggests that the adverse impact of debt on investment primarily affects firms lacking profitable investment opportunities, yet striving for rapid growth.

These insights collectively build upon and challenge Modigliani and Miller's original hypothesis, illustrating a more complex and nuanced understanding of the interplay between leverage, investment decisions, and firm growth. They highlight that while debt can be a constraint, it also serves as a mechanism to balance investment decisions, aligning them more closely with the firm's actual growth potential and market conditions.

Aivazian, Ge, and Qiu (2005) present a pivotal critique of the pooling regression model, specifically in its assessment of the impact of leverage decisions on future investment. The authors argue that this model significantly underestimates the influence of leverage, as it fails to account for individual firm effects. This leads to an oversimplified understanding of the complex dynamics at play. In a pioneering move, their study is the first to explore the relationship between leverage decisions and a firm's future investment within the context of Canadian listed companies. Distinct from previous literature, they employ a fixed-effect model, a methodological innovation that allows for a more nuanced analysis of how leverage impacts a firm's investment decisions.

The authors propose an intriguing theory: leverage can act as a mechanism to counter the overinvestment problem, a challenge rooted in the conflict between management and shareholders. They observe that managers often have a propensity to prioritize the expansion of the company's scale, sometimes at the expense of the quality of investment projects. This tendency can dilute shareholders' earnings, as the focus shifts away from project quality.

The study posits that the availability of cash flow inherently limits management's ability to invest indiscriminately. This constraint is further intensified by issuing debt. With the added pressure of debt obligations, firms are compelled to allocate cash, which could have been used for suboptimal projects, towards servicing their debt in the form of interest and principal payments.

Their empirical findings align with this theory, demonstrating that the negative correlation between leverage and investment is particularly pronounced in firms with lower growth opportunities. This suggests that in such firms, leverage acts effectively as a deterrent against poor investment decisions, aligning the firm's investments more

closely with its actual growth potential and the interests of its shareholders. Aivazian, Ge, and Qiu's research thus sheds new light on the strategic role of leverage in corporate finance, particularly in moderating investment decisions and balancing the interests of management and shareholders in the context of Canadian listed companies.

Cai and Zhang (2011), utilizing financial data from US-listed companies, reveals a notable negative association between increases in leverage and future investments. This finding underscores the potential constraints that debt can impose on a firm's capacity to invest in future growth opportunities. Similarly, Marchia and Mura (2011) focuses on the impact of debt overhang on investments in UK listed companies. Their analysis presents a compelling correlation: firms currently shouldering a lower debt burden are more likely to increase their investments in subsequent periods. This suggests a direct link between a firm's debt levels and its investment agility. Masta (2011) investigate into the US supermarket industry offers a unique perspective. By examining whether debt financing affects product quality and future investments of corporations, Masta uncovers that significant debt overhang not only compromises product quality but also curtails profitable investments. This dual impact highlights the broader implications of debt on a firm's operational and strategic facets. Gebauer, Setzer, and Westphal's 2018 study expands the geographical scope to five European countries. They find that issuing debt significantly affects future investments, particularly in small and medium-sized firms that are more prone to productivity shortfalls and financial distress. Interestingly, they note that this effect diminishes in larger firms, where the influence of earnings relative to leverage becomes less significant as the firm size increases. Ozan et al. (2019) encompasses eight European countries, providing a broader view of the dynamics between leverage and investment. Their findings indicate that long-term debt can positively influence future investments, attributed to the lower rollover risk associated with firms having a higher share of long-term liabilities. However, they also observe a negative effect for firms where leverage

is tied to weak bank exposure to sovereign risk.

Collectively, these studies offer a rich tapestry of insights into how leverage impacts investment decisions across different contexts. From the constraints posed by high debt levels to the varying effects in companies of different sizes and in diverse markets, this body of research contributes significantly to our understanding of corporate finance strategies in an international context.

While numerous studies have shed light on the overarching influence of leverage constraints on a firm's investment decisions, these analyses often overlook the intricacies within diversified firms. To address this gap, Ahn and Denis (2006) delves into how leverage impacts investment opportunities across different segments of a diversified firm. A key distinction highlighted in their research is the unique management approach within diversified firms compared to focused firms. In diversified entities, managers tend to allocate the debt burden across various business divisions in a disproportionate manner. This allocation strategy contrasts sharply with the more uniform approach observed in focused firms. Their findings reveal a pronounced negative correlation between investment and leverage, particularly in segments exhibiting high growth potential. This relationship is markedly less evident in core segments compared to non-core segments of the firm. This differentiation suggests that segments with robust growth prospects are more susceptible to the restrictive effects of leverage. Moreover, the study uncovers that the managerial discretion inherent in diversified structures can, to some extent, counterbalance the disciplinary benefits that debt usually offers. This implies that the flexibility and strategic decision-making in diversified firms can somewhat mitigate the constraining impact of leverage on investment opportunities. In essence, Ahn and Denis's research contributes a critical perspective to the discourse on corporate finance, emphasizing how the structure and management strategies of diversified firms can influence the

interplay between leverage and investment. Their work underscores the importance of considering organizational complexity and strategic management when assessing the financial decisions and growth trajectories of diversified corporations

Prevailing literature predominantly focuses on the implications of long-term debt when examining the connection between leverage and future investments. However, the role of short-term liabilities, which can significantly influence investment opportunities, merits equal attention. Moyen (2006) study pioneers this area by positing that short-term debt adversely affects prospective investments, regardless of whether the opportunities are favorable or not. Diamond and He (2014) further delves into the impact of short-term debt on future investments. They contend that short-term debt can swiftly escalate a firm's financial strain, consequently curtailing its ability to invest in future projects. Their analysis highlights several critical mechanisms through which this occurs. Firstly, they note that in times of market volatility, the issuance of short-term debt can exacerbate the overhang effect, even for immediate investment decisions. Secondly, they observe that the combination of shorter-term debt and adverse market conditions can severely diminish the investment incentives of equity holders, primarily due to the reduction in equity value. This situation could even lead to preemptive default by equity holders. Thirdly, the threat of erasing future growth opportunities due to short-term debt can dampen shareholders' enthusiasm for investment. In a similar vein, Vu and Brown's 2013 study, which scrutinizes data from US non-financial listed firms, argues that companies with a higher proportion of short-term debt are more inclined to reduce future investments compared to their counterparts. This propensity is attributed to short-term liabilities amplifying the negative impact of financial distress risk on future investment decisions. These studies collectively underscore a critical dimension in corporate finance: the influence of short-term debt on a firm's investment trajectory. They highlight that while long-term debt has been the traditional focus, short-term liabilities play an equally pivotal role in

shaping a firm's investment strategy and its response to market conditions and financial pressures.

2.3 Model and Hypothesis

Echoing the approach of earlier studies, such as those by Sunder and Myers (1999) and Frank and Goyal (2003), this paper treats investments as exogenous, focusing on large public firms. These firms are characterized by their ability to issue debt that is essentially free from default risk. In essence, the pecking order theory, which forms the core of this discussion, posits that companies typically resort to debt issuance when their internal cash flows fall short of meeting their dividend obligations or investment needs. In this framework, equity issuance is not a preferred option. It's important to note that the theoretical simplicity of the pecking order theory contrasts with the practical complexity of real-world accounting structures in enterprises. In practice, these structures are far more intricate than the model suggests. Therefore, a certain level of aggregation of accounting subjects is necessary before conducting empirical tests. This aggregation helps in aligning the complex financial realities of firms with the theoretical constructs, thereby enabling a more accurate and meaningful analysis. By adopting this approach, the paper aims to bridge the gap between the theoretical underpinnings of the pecking order theory and the practical financial operations of large public firms. This reconciliation is crucial for understanding how these firms navigate their financing decisions, particularly in terms of balancing debt and equity in alignment with their investment strategies and financial constraints.

Basic notation Define:

DIVt = Dividends payments at time t

It = Net investment at time t (Capital Expenditure + increase in investments + acquisitions + other use of funds – sale of PPE – sale of investment)

Ct = Cash flow before interest and tax at time t (Cashflow+ equity in net loss – earnings + gain (loss) from sale of PPE + tax refund + depreciation and amortization + tax expenses)

ΔW = change in working capital at time t (Change in operating working capital + change in cash and cash equivalents + change in current debt)

ΔDt = Net debt issued at time t (long-term borrowing issuance + bond issuance)

The financial deficits can be obtained from aggregating the flow funds of data:

$DEFt = DIVt + It + \Delta Wt – Ct$

According to pecking order hypothesis, debt issue is the primary choice when firm fill up their financial deficits. The specification is therefore shown as:

$\Delta Dit = \alpha + \beta DEFit + \varepsilon it.$ (2.1)

In this model, all the variables are scaled by the book value of total assets. however, the estimated coefficient in a regression model could be seriously influenced if the scaling is by a variable that is strong related with the variables in equations. Therefore, a correlation analysis will be employed before the regression test. The pecking order hypothesis can be established by from this formula.

H1: The financial deficits will positively influence the debt issuance. Specifically,

each unit change in the deficits should cause a similar amount increases in debt issuance.

Under the pecking order theory, a good fit will be reflected in an intercept of zero, a slope higher than 0.5. According to previous studies, the financial deficits may not follow the pecking order theory. However, the debt issuance could be solely driven by the individual elements, the alternative model thus needs to be tested:

$$\Delta Dit = \alpha + \beta divDIVt + \beta Iit + \beta w\Delta Wt - \beta cCt + \varepsilon it \quad (2.2)$$

Capital Structure Regression Analysis

Pecking order model is mainly used to examine the changing of leverage. However, to explain the correlation between leverage and future investments, it is important to examine firms' gearing level as well. A capital Structure regression analysis thus will be conducted. Based on the previous studies, the selected determinants in this study will be asymmetric information, tangibility, intangibility, sales, profitability, tax, growth potential, and financial deficits. The basic regression model is therefore:

$$Di = \alpha + \beta tTangii + +\beta itITANGIi + \beta MTBMTBi + \beta LSLSi\ /LogTA/Amihud + \beta pPi + \beta defDEFi + \varepsilon i \quad (2.3)$$

2.3.2 Hypothesis of Asymmetric Information

Numerous studies have underscored the significance of asymmetric information as a central determinant in shaping a firm's capital structure. Prominent research in this field includes works by Frank and Goyal (2003), Fama and French (2005), and Bharath et al. (2009). These studies collectively emphasize how asymmetric information

influences financial strategies within firms.

A commonly used measure for assessing asymmetric information is the logarithm of total assets. This metric has long been considered a reliable indicator, with the premise that larger firms, typically characterized by higher sales, are more diversified and thus less susceptible to the effects of asymmetric information. According to the pecking order theory, such firms are expected to exhibit lower debt levels due to their reduced exposure to information asymmetries.

Contrastingly, these larger firms, owing to their better reputation and lower information costs when borrowing, might paradoxically exhibit higher leverage. This complexity in their financial behavior suggests a nuanced relationship between firm size, asymmetric information, and leverage. Another pivotal tool in measuring asymmetric information is the Amihud illiquidity ratio, introduced by Amihud in 2002. This metric, which evaluates market liquidity, is calculated based on the dollar return and daily transaction volume. Its application extends to understanding how liquidity factors into the broader context of asymmetric information in financial markets. Findings from various studies consistently reveal that firms experiencing greater asymmetric information tend to increase their leverage. This increase is often attributed to the higher cost of equity that stems from the amplified adverse selection associated with information asymmetries. If the pecking order theory holds true, it implies that smaller firms, being more prone to asymmetric information, are likely to be more affected by these dynamics.

We then test the following hypothesis:

H2: The firms with larger size and higher sale volume tend to have less leverage level, whereas the firm with higher illiquidity ratio tend to be more leveraged.

2.3.3 Hypothesis of Tangibility and Intangibility

The impact of tangibility on leverage, as reported in previous studies, presents an inconsistent narrative. Harris and Raviv (1991) posited that firms with fewer tangible assets are more prone to serious asymmetric information issues. Consequently, such firms, possessing lower levels of tangible assets, are likely to adhere more closely to the pecking order theory. This hypothesis suggests a nuanced relationship between tangible assets and the degree of information asymmetry a firm face. On the other hand, Frank and Goyal (2003) argued from a different perspective, highlighting that tangible assets can serve as collateral to support debt financing. This viewpoint suggests a direct correlation between the presence of tangible assets and the ability of a firm to secure debt. Further adding to this discourse, Chen et al. (2014) observed a positive impact of tangibility on Chinese listed firms. Based on these findings, the current study hypothesizes that tangibility is likely to have a positive influence on the leverage level. The relationship between intangible assets and leverage, particularly in the context of Chinese listed firms, remains relatively unexplored. Steve and Antonio (2014) discovered a positive relationship between these two variables in Canadian listed firms. However, the dynamics in the Chinese stock market might present a different scenario. In China, listed companies with high intangible assets are often young and face funding shortages. This characteristic may make them more susceptible to greater asymmetric information, influencing their leverage decisions. Therefore, the hypothesis will be established as:

H3: Both tangibility and intangibility will positively influence the leverage level.

2.3.4 Hypothesis of Growth Opportunities

Myers (1977) posit a critical relationship in corporate finance: firms with abundant growth opportunities are more inclined to finance through equity rather than debt. This preference is attributed to the potential constraints that debt can impose on a firm's

ability to capitalize on investment opportunities. Myers's theory suggests that the burden of debt might restrict a company's flexibility and readiness to pursue growth-oriented ventures. Supporting this viewpoint, empirical studies by Barclay and Morellec (2006) and Goyal, Lehn, and Racic (2002) have also identified similar patterns. These studies reinforce the notion that firms with significant growth prospects often opt for equity financing to maintain strategic agility and avoid the limitations imposed by debt.

However, the context changes when considering the Chinese market, as noted by Chen et al. (2014). In China, the government's stringent regulations on equity issuance present a unique challenge for high-growth companies. These regulations can limit the ability of these firms to secure sufficient funding through equity financing, compelling them to explore alternative financing routes. This scenario underscores a crucial market-specific dynamic where regulatory environments significantly influence corporate financing decisions. Consequently, this study make hypothesis:

H4: The firms with high growth opportunities tend to be more leveraged.

2.3.5 Hypothesis of Profitability

According to the trade-off theory, highly profitable firms are expected to borrow more to capitalize on tax savings. This theory posits that the tax shield provided by debt can be particularly advantageous for firms with substantial profits. The agency theory further supports high leverage in profitable firms, suggesting that it serves as a mechanism to constrain managerial discretion, thereby aligning management interests more closely with those of the shareholders. Conversely, the pecking order theory presents a different perspective. It advocates that internal financing is the preferred option for firms, suggesting that more profitable firms will rely less on external debt

over time. This theory posits that the availability of internal funds reduces the need for external debt, leading to a decrease in leverage for firms with higher profitability. Chen et al. (2014) adds a nuanced dimension to this discussion, particularly in the context of the Chinese market. They indicate that profitable firms in China are more inclined to issue equity, a trend partly driven by the strict regulatory framework governing Secondary Equity Offerings (SEOs) in the country. This regulatory environment affects the financing choices of profitable firms, reinforcing the negative relationship between profitability and debt level. These contrasting viewpoints from different financial theories and the specific regulatory context in China highlight the complexity of the relationship between profitability and leverage. The decision to leverage depends not only on the theoretical underpinnings of financial management but also on the regulatory environment and market-specific factors. Thus, this study predicts:

H5: Profitability will significantly and negatively impact the leverage level of Chinese firms.

2.3.6 Hypothesis of Tax

Trade-off theory predicts that firms, to get the tax shields, tend to issue more debt when tax rates are higher. The previous Chinese studies showed an insignificant relationship between tax rates and capital structure. According to Chen *et al* (2014), firms focus on the security of financing source more than saving taxes. Hence, this paper predicts:

H6: There is no significant relationship between the tax and leverage level.

2.3.7 Hypothesis of Deficits

Deficits occurred could cause the situation that firms are in short of funding. Pecking

order theory argued that firms is intended to borrow to cover their insufficient funding. Thus, this study assumes:

H7: The debt level will increase as the financial deficits grows

2.3.8 Hypothesis of Debt Overhang and Future Investments

According to Myers (1977), high debt overhang could cause firms to forgo some positive NPV projects. Aivazian *et al* (2005) and Cai (2011) also found a negative effect of debt overhang on future investment. The basic regression model is similar to Lang *et al* (1996)'s study but is extended to a panel setting. Short-term debt is also integrated into the formula, as it makes up a large part of Chinese listed companies' debt structure. The regression model will be:

$$Iit/Ai,t\text{-}1 = \alpha+\beta cf(CFit/Ai,t\text{-}1) + \beta qQi,t\text{-}1 + \beta levLeveragei,t\text{-}1+\beta s(Salei,t\text{-}1/Ai,t\text{-}1)+ \varepsilon i,t \quad (2.4)$$

Where Ii,t is the capital expenditure of firm at time t; Ai,t-1 is lagged total value of assets; CFit is the cash flow at time t; Qi,t-1 is lagged Tobin's Q; Leveragei,t-1 are lagged long-term debt and short-term debt; Salei,t-1 represents lagged net sales, and εi,t is the error term.

2.3.9 Hypothesis of Long-term debt and Investments

According to Myers (1977), high level of debt could cause shareholders forgoes some positive NPV projects, as most of the benefits from investments could be accrued to debtholders rather than shareholders. Both of Aivazian *et al* (2005) and Cai and Zhang(2011) found a negative influencing of debt overhang on future investment. Therefore, we expect:

H8: long-term debt overhang will negatively impact the future investments.

2.3.10 Hypothesis of Short-term debt and Investments

Myers (1977) argued that taking on short-term debt could be a solution to underinvestment problem, as the companies can negotiate to extend the maturity of debt before it matures, thereby reducing their financial pressure. However, Diamond and He (2014) counters this idea and argued the short debt would further reduce the future investments. According to Diamond and He (2014), extending the maturity of debt from short-term to long-term is indeed impractical; Thus, the financial pressure of will increase sharply in near future. Vu and Brown (2013) do an empirical research on US listed companies, their findings suggested that firms with large short-term debt are likely to cutdown their future investments. Therefore, this study predicts:

H9: Future investments will be cut down by increases in the short-term debt.

2.3.11 Hypothesis of Free Cash Flow and Investments

Generally speaking, the firms with those firms with sufficient cash flow have more incentives to size the investment opportunities, by which their market share will be expanded and growth speed will be increased. Empirical work of Aivazian *et al* (2005) also found a positive relationship between investments and free cash flow. We thus test the hypothesis:

H10: Firms with abundant cashflow tend to do more future investments.

2.3.12 Hypothesis of Growth and Investments

The findings on the relationship between growth opportunities and future investments are ambiguous. Avivazian *et al* (2005) showed a strong significant correlation between Tobin's Q and investments on US firms. However, Cai and Zhang (2011) found no relationship between the MB ratio and future investments in Canada listed firms. The proxy of growth is Tobin's Q, which is consistent with Avivazian *et al* (2005). The average of Tobin's Q over 1 means the Chinese market is with substantial growth expectations during the period. Here we assume:

H11: firms with growth opportunities have more incentives to make investments

2.3.13 Hypothesis of Sales and Investments

High sales volume may boost the free cashflow of a firm. The firms with high sales volume also have incentives to do more investment to expanding their business. Therefore, it is reasonable to make hypothesis:

H12: Future investments can be positively affected by the sales volume

2.4 Data

2.4.1 Data Description

This study utilizes annual data sourced from the annual reports of 1,047 Chinese companies listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) over the period from 2000 to 2018. The data is compiled from two comprehensive databases: the China Stock Market Accounting Research database (CSMAR) and the Wind database. The selected companies predominantly belong to the traditional manufacturing sector and the burgeoning IT and technology industry.

After excluding instances with missing variables, the final sample size amounts to approximately 16,407 observations. In the analysis of debt overhang, considering the lag effect, the actual number of observations is reduced to 15,359. Mirroring the approach used by Chen et al. (2014), the effective tax rate is winsorized at 0 and 1 to limit the influence of extreme values, while all other variables are winsorized at the 1% level at both the top and bottom ends of the distribution. Apart from the effective tax rate and log of sales, all other variables in the study are normalized against the book value of total assets to facilitate comparability.

Two alternative measures of debt are employed in the pecking order test. The first measure combines long-term borrowing and bond issuance, divided by total assets. This measure primarily assesses the extent to which firms use long-term debt to cover their financial deficits. Recognizing the significance of short-term debt in the capital structure of Chinese firms, the second measure is the gross debt, also divided by total assets. In the debt overhang analysis, the ratios of long-term and short-term debt to total assets are used as proxies for leverage.

2.4.2 Descriptive statistics

Panel A provides a comprehensive overview of the descriptive statistics for the variables used in our regression models. The average gross debt ratio stands at 47.5%, closely aligning with the 48% figure reported by Chen (2003) for Chinese listed firms between 1995 and 2000. This consistency suggests that the capital structure of these companies has remained relatively stable over the past two decades. Notably, 75% of these firms have a leverage level exceeding 30%, as indicated by the 25th percentile of the gross debt ratio, implying that debt financing remains a predominant fundraising method.

However, the composition of this debt reveals a significant tilt towards short-term liabilities. The mean ratios for long-term debt, long-term borrowing, and bond issues are relatively low at 0.069, 0.042, and 0.007, respectively, in stark contrast to the much higher short-term debt ratio of 40.6%. Furthermore, short-term debt constitutes 86.6% of the gross debt on average, underscoring the heavy reliance on short-term financing among Chinese listed firms. Tangible assets are more prevalent, with a mean ratio of 0.214, compared to a lower intangible ratio of 0.038. The average Tobin's Q of 2.3 suggests robust growth opportunities in Chinese markets during this period. The average capital expenditure ratio is 0.113, with a standard deviation of 0.166, indicating substantial variability in investment levels.

Panels B and C contrast IT and technology firms with Non-IT firms. Notably, the gross debt ratio in manufacturing is about 12% higher than in IT firms, suggesting a greater reliance on debt financing in traditional industries. Both sectors predominantly use short-term debt, highlighting this as a common financing approach among Chinese companies. The log of total assets values – 9.05 for IT and 9.40 for Non-IT firms –

indicates that traditional manufacturing firms are generally larger than IT firms. In terms of effective tax rates, manufacturing firms face an average rate approximately 6% higher than IT firms, possibly reflecting government incentives for young and innovative companies in the I&T sector. The IT and technology industry also exhibits a higher average Tobin's Q by 0.8, indicating greater growth potential. Lastly, the average capital structure ratio is 0.32 higher in the IT and technology industry, suggesting these younger firms are more inclined to invest in expanding their business.

Table 2.1. Descriptive Statistics

Descriptive statistics on tested variables. Panel A in this table represents the descriptive statistics for the full sample. Panel B presents the subsample of the IT and technology firms; those firms have traits of higher growth and smaller size. Panel C summarize the statistics for subsample of non-I&T firms; this sector is mainly composed of manufacturing firms, with bigger size and lower growth.

variable	N	mean	p25	p50	p75	min	max	sd
Panel A: Full Sample								
Gross Debt	16407	0.475	0.316	0.475	0.624	0.0546	1.229	0.218
Long-debt	16407	0.0695	0.00526	0.0312	0.0983	0	0.431	0.0909
Current-debt	16407	0.406	0.262	0.394	0.535	0.0460	1.100	0.198
CD/GD	16380	0.866	0.798	0.921	0.984	0.341	1	0.152
Long-borrow	16407	0.0415	0	0.00201	0.0553	0	0.335	0.0705
Bond	16407	0.00777	0	0	0	0	0.164	0.0282
logTA	16407	9.346	8.957	9.316	9.708	7.936	11.01	0.604
Amihud	14309	0.271	0.0293	0.0685	0.210	0.00373	5.625	0.701
Tangibility	16407	0.214	0.0850	0.186	0.308	0.00129	0.678	0.160

Intangibility	16407	0.0384	0.00947	0.0278	0.0522	0	0.223	0.0409
Tax	16442	0.186	0.0938	0.158	0.252	0	1	0.157
Tobin's Q	16442	2.300	1.177	1.745	2.765	0.228	12.20	1.933
Profit	16407	0.0496	0.0158	0.0443	0.0820	-0.282	0.306	0.0799
Sale	16407	0.725	0.366	0.592	0.909	0.0428	3.112	0.541
Net invests	16407	0.0568	0.00699	0.0413	0.0952	-0.169	0.340	0.0827
Dividend	16407	0.0239	0.0109	0.0200	0.0312	0	0.119	0.0200
Cashflow	16407	0.0833	0.0269	0.0785	0.137	-0.205	0.380	0.0990
ΔWC	16407	0.125	-0.0379	0.0733	0.235	-1.083	1.964	0.376
Deficits	16407	0.137	-0.0556	0.0579	0.250	-1.306	2.884	0.482
Capital ex	16407	0.113	0.0250	0.0624	0.130	0	1.074	0.166
Panel B: I&T Sample								
Gross Debt	2678	0.370	0.207	0.355	0.497	0.0546	1.229	0.209
Long-debt	2678	0.0420	0.00174	0.0122	0.0478	0	0.431	0.0725
Current-debt	2678	0.329	0.177	0.302	0.440	0.0460	1.100	0.194
CD/GD	2678	0.897	0.857	0.956	0.994	0.341	1	0.141
Long-borrow	2678	0.0194	0	0	0.00892	0	0.335	0.0496
Bond	2678	0.00457	0	0	0	0	0.164	0.0220
logTA	2678	9.050	8.658	9.044	9.439	7.936	11.01	0.579
Amihud	2015	0.211	0.0233	0.0561	0.136	0.00373	5.625	0.660
Tangibility	2678	0.145	0.0438	0.103	0.207	0.00129	0.678	0.135
Intangibility	2678	0.0339	0.00725	0.0228	0.0467	0	0.223	0.0388
Tax	2683	0.134	0.0693	0.125	0.164	0	1	0.122
Tobin's Q	2683	2.832	0.882	2.301	3.762	0.228	12.20	2.503
Profit	2678	0.0682	0.0260	0.0595	0.108	-0.282	0.306	0.0916
Sale	2678	0.625	0.355	0.529	0.796	0.0428	3.112	0.410

Net invests	2678	0.0703	0.0109	0.0494	0.117	-0.169	0.340	0.0944
Dividend	2678	0.0217	0.00733	0.0156	0.0272	0	0.119	0.0230
Cashflow	2678	0.0944	0.0317	0.0787	0.148	-0.205	0.380	0.107
ΔWC	2678	0.215	-0.0271	0.0990	0.313	-1.083	1.964	0.515
Deficits	2678	0.259	-0.0287	0.0752	0.343	-1.306	2.884	0.712
Capital ex	2678	0.140	0.0280	0.0673	0.157	0	1.074	0.206
Panel C: Non-I&T								
Gross Debt	13729	0.496	0.344	0.499	0.641	0.0546	1.229	0.214
Long-debt	13729	0.0748	0.00687	0.0375	0.109	0	0.431	0.0931
Current-debt	13729	0.421	0.282	0.412	0.548	0.0460	1.100	0.195
CD/GD	13702	0.859	0.786	0.912	0.981	0.341	1	0.153
Long-borrow	13729	0.0459	0	0.00685	0.0632	0	0.335	0.0732
Bond	13729	0.00840	0	0	0	0	0.164	0.0292
logTA	13729	9.403	9.013	9.364	9.759	7.936	11.01	0.592
Amihud	12294	0.281	0.0301	0.0709	0.229	0.00373	5.625	0.707
Tangibility	13729	0.227	0.101	0.203	0.324	0.00129	0.678	0.161
Intangibility	13729	0.0393	0.0101	0.0289	0.0533	0	0.223	0.0412
Tax	13759	0.196	0.103	0.168	0.262	0	1	0.161
Tobin’s Q	13759	2.196	1.187	1.679	2.575	0.228	12.20	1.783
Profit	13729	0.0459	0.0146	0.0414	0.0780	-0.282	0.306	0.0769
Sale	13729	0.744	0.369	0.606	0.938	0.0428	3.112	0.560
Net invests	13729	0.0542	0.00635	0.0399	0.0922	-0.169	0.340	0.0800
Dividend	13729	0.0244	0.0118	0.0207	0.0318	0	0.119	0.0194
Cashflow	13729	0.0811	0.0258	0.0784	0.136	-0.205	0.380	0.0973
ΔWC	13729	0.107	-0.0406	0.0688	0.220	-1.083	1.964	0.339
Deficits	13729	0.113	-0.0598	0.0544	0.238	-1.306	2.884	0.419

Capital ex	13729	0.108	0.0244	0.0617	0.126	0	1.074	0.157

2.5 Empirical Results

2.5.1 Pearson Analysis of Leverage

Since the pooling regression model ignoring individual effects will cause under-estimation; fixed effect model and random effect model are thus employed in this study. As the efficiency of estimated coefficients could be significantly affected by the high correlation among the independent variables, correlation analysis has been used to examine the correlation between these variables. The tables show us the results of the correlation analysis. All the correlations among these independent variables are less than 0.5, indicating there is no serious collinearity problem. To save space, the table of correlation analysis will be shown in the appendix.

2.5.2 Pecking Order Test

Table 2 show the results of pecking order regressions for the period from 2000 to 2018. Following approaches of Previous studies (Sunder and Myers (1999), Frank and Goyal (2003)), the results separately reported as long-term borrowing issued and change in the gross debt issued. The study also tries to match their sample selection criteria that firms are requiring to report variables in continuous. In our sample, a total of 1047 companies in accordance with this criterion.

Panel A in table 2 starts with the gross debt change ratio as the dependent variables. The column (1) and (2), (3) and (4), as well as (5) and (6) represents the results of all firms, IT firms and traditional manufacturing firms, respectively. According to Column (1) and (2), there is a positive relationship between gross debt change and deficit ratio at 5% significant level. When all the firms classified into the subsample, (3) and (4) shows a negative relationship between gross debt and deficits at significant 1% level for IT firms.

Simultaneously (5) and (6) suggest that the deficits will positively impact manufacturing firms' gross debt change at the 1% significant level. Under the pecking order model, one unit increase in deficit should have a similar unit impact on debt change. The absolute values of all the estimated coefficients are no more than 0.02. Therefore, the significant results are only statistically but not economically. To sum up, Chinese firms do not seem to follow the hierarchical level of traditional pecking order theory, no matter their type, size, and age.

Table 2.2. Empirical Results of Pecking Order Test (Deficits) Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The table provides the empirical results of pecking order test by using alternatives model (Fixed model and Random Model). t-Statistics are provided in Parenthesis below the coefficients estimates. In panel A, the change in gross debt ratio is the dependent variable, while change in long-term borrowing is the dependent variable in panel B.

			Panel A			
	All firms Fixed	Random	IT Firms Fixed	Random	Non-It Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Gross Debt	Gross Debt	Gross Debt	Gross Debt	Gross Debt	Gross Debt
Deficits	0.009**	0.008**	-0.015***	-0.013***	0.021***	0.019***
	(2.09)	(2.11)	(-2.98)	(-2.96)	(3.38)	(3.54)
Constant	-0.005***	-0.004***	-0.005***	-0.005***	-0.005***	-0.005***
	(-7.94)	(-6.80)	(-4.18)	(-3.36)	(-6.96)	(-6.22)
Observations	15,325	15,325	2,465	2,465	12,860	12,860
R-squared	0.001		0.006		0.005	
Number of code	1,047	1,047	208	208	839	839
F test	0.0366	0.0347	0.00324	0.00312	0.000745	0.000394
r2_a	0.00121	.	0.00557	.	0.00529	.
F	4.380	.	8.872	.	11.46	.
			Panel B			
	All firms Fixed	Random	IT Firms Fixed	Random	Non-It Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Long-Borrow	Long-Borrow	Long-Borrow	Long-Borrow	Long-Borrow	Long-Borrow

Deficits	0.001	0.001	0.001	0.001	0.001	0.001
	(0.69)	(1.22)	(0.70)	(0.90)	(0.44)	(0.95)
Constant	0.001***	0.001***	0.000	0.000	0.001***	0.001***
	(5.20)	(3.64)	(0.97)	(0.62)	(5.04)	(3.65)
Observations	15,325	15,325	2,465	2,465	12,860	12,860
R-squared	0.000		0.000		0.000	
Number of code	1,047	1,047	208	208	839	839
F test	0.488	0.221	0.486	0.367	0.663	0.342
r2_a	-9.60e-06	.	-0.000106	.	-4.78e-05	.
F	0.482	.	0.488	.	0.190	.

Panel B in Table 2.2 gives us the results of aggregation of long-term borrowing and bond issue as dependent variables. The column (1) and (2), (3) and (4), as well as (5) and (6) represents the results of all firms, IT firms and traditional manufacturing firms, respectively. As reported in all columns of table 5.3, none of the estimated coefficients is even at the 10% significant level. This suggests that, at least, the long-term debt is not the primary funding choice for Chinese companies; this is significantly difference with previous studies on US firms, in which the results strongly support the pecking order theory.

2.5.3 Pecking order test with disaggregating deficit

Although the relationships between debt issue and deficits in aggregated pecking order tests are not significant, it is still necessary to examine the impact of individual components of deficits on the debt issue. Table 3 and 4 show the regression results of the disaggregated deficit component for the Gross-debt and long-term debt issued as dependent variables.

Table 2.3 shows when the gross debt change is considered as the independent variables. First row suggests that net investment has a positive impact to the gross debt change for manufacturing firms, while IT firms' gross debt change is not affected by the investment. Compare with the manufacturing firms in long-term borrowings, the coefficient value here is higher nearly by 7%. This suggests that firms may more willing to invest in short-term debts as funding source. Results of change in working capital indicated a negative influence on gross debt change of IT firms; however, the absolute value of 0.038 is not big enough to represent economic sense. The results of dividend payments are consistent with the prediction of the theories. For IT firms, the gross debt change is significantly impacted by the dividend payments in positive, with the coefficients of 28.7%; this mean the IT firms could rely on the short-term debt to pay their dividend, as there is no relationship between dividend payment and long-term borrowings. The relationship between cash flow and gross debt change shows as negative for both industries. Compare with the results in long-term borrowings table, the coefficient here are higher by nearly 7% of each industry, which further

emphasized the importance of short-term debt for Chinese listed companies.

Table 2.4 shows significant positive relationships between net investment and long-term borrowings issued for both industries; this is consistent with the predictions of pecking order theory and trade-off theory. Pecking order theory argued that debt would increase with the investment amount growth after using the internal cashflows. According to trade-off theory, a firm investing more will increase its tangible assets, thereby increasing its debt capacity. However, all the coefficients' values are far from the requirement of the pecking order model. It only can be concluded that, for Chinese firms, the investment seems to significantly influence the issuance of debt but has no actual effect. In terms of the correlation between dividend payment and debt issuance, both theories predict a positive relation. However, our findings show there is no relationship between the two variables, regardless of industry type.

Further, the results indicated a significant and negative relationship between change in working capital and long-term borrowing issued, which is the difference with the prediction of pecking order theory. The values of coefficients are also too small to represent economic significance. Lastly, the results of cash flow are consistent with large of previous literatures that found a negative relationship between leverage and profitability. Under the pecking order theory, the available cash flow normally reduces the issuance of debt.

In summary, the empirical findings presented so far suggest that the traditional pecking order theory does not work for Chinese listed companies. Based on pecking order theory, the young and high growth firms are thought to be influenced by adverse selection problems. However, this pecking order hypothesis is strongly rejected by the findings. Moreover, for Chinese companies, short-term debt has a higher priority than long-term debt. Thus, long-term borrowing could be a last resort, which is contrary to the pecking order hypothesis.

Table 2.3. Empirical results of Disaggregating Pecking Order Test (gross debt)

	All Firms		IT Firms		Non-IT	
	Fixed	Random	Fixed	Random	Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt
Net Invest	0.127***	0.100***	-0.006	0.013	0.163***	0.122***
	(6.91)	(6.71)	(-0.18)	(0.41)	(7.65)	(7.16)
Δwcr	-0.004	-0.005	-0.038***	-0.033***	0.008	0.006
	(-0.74)	(-0.92)	(-5.32)	(-5.37)	(1.04)	(0.90)
Dividend	0.152**	0.179***	0.287*	0.273**	0.099	0.130**
	(2.04)	(3.39)	(1.93)	(2.27)	(1.15)	(2.21)
Cfr	-0.155***	-0.145***	-0.108***	-0.097***	-0.156***	-0.148***
	(-10.17)	(-12.20)	(-3.04)	(-3.35)	(-9.24)	(-11.24)
Constant	-0.001	-0.001	0.004	0.001	-0.002	-0.001
	(-0.36)	(-0.48)	(0.82)	(0.16)	(-0.63)	(-0.48)
Observations	15,325	15,325	2,465	2,465	12,860	12,860
R-squared	0.019		0.035		0.022	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0	0	0	0
r2_a	0.0183	.	0.0339	.	0.0221	.
F	35.21	.	15.88	.	34.13	.

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The table provides the empirical results of disaggregating test by using alternatives model (Fixed model and Random Model). t-Statistics are provided in Parenthesis below the coefficients estimates

Table 2.4. Empirical results of Disaggregating Pecking Order Test (long-term borrow)

	All Firms		IT Firms		Non-It	
	Fixed	Random	Fixed	Random	Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Long borrow	Long borrow	Long borrow	Long borrow	Long borrow	Long borrow
nir	0.090***	0.079***	0.076***	0.070***	0.093***	0.082***
	(11.99)	(12.94)	(4.45)	(4.82)	(11.15)	(11.93)
dwcr	-0.005***	-0.004***	-0.001	-0.001	-0.007***	-0.006***
	(-2.91)	(-2.92)	(-0.43)	(-0.26)	(-3.25)	(-3.22)
divr	-0.019	0.020	-0.059	-0.031	-0.014	0.029
	(-0.70)	(1.03)	(-1.12)	(-0.74)	(-0.44)	(1.36)
cfr	-0.067***	-0.065***	-0.028***	-0.035***	-0.076***	-0.072***
	(-9.91)	(-12.12)	(-2.60)	(-3.88)	(-9.69)	(-11.62)
Constant	0.003***	0.002***	-0.001	-0.000	0.003***	0.003***
	(2.74)	(3.33)	(-0.33)	(-0.21)	(3.07)	(3.69)
Observations	15,325	15,325	2,465	2,465	12,860	12,860
R-squared	0.025		0.026		0.026	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	2.96e-05	2.66e-06	0	0
r2_a	0.0249	.	0.0243	.	0.0262	.
F	56.32	.	6.932	.	50.60	.

Robust t-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The table provides the empirical results of disaggregating test by using alternatives model (Fixed model and Random Model). t-Statistics are provided in Parenthesis below the coefficients estimates.

Table 2.5. Leverage regression analysis with gross debt

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt
tangi	0.077**	0.057**	0.271***	0.273***	0.046	0.015
	(2.51)	(2.12)	(4.39)	(4.57)	(1.41)	(0.53)
itangi	0.016	-0.043	0.085	0.071	0.002	-0.068
	(0.18)	(-0.53)	(0.55)	(0.51)	(0.02)	(-0.74)
sale	0.096***	0.095***	0.175***	0.177***	0.084***	0.082***
	(11.59)	(13.48)	(9.26)	(9.79)	(9.70)	(11.27)
profit	-0.596***	-0.673***	-0.472***	-0.538***	-0.646***	-0.718***
	(-14.63)	(-17.28)	(-6.06)	(-6.95)	(-13.65)	(-15.92)
tax	-0.010	0.003	-0.068*	-0.053	-0.007	0.002
	(-0.86)	(0.27)	(-1.84)	(-1.44)	(-0.54)	(0.19)
tobinq	-0.017***	-0.017***	-0.006**	-0.006***	-0.021***	-0.020***
	(-8.91)	(-8.96)	(-2.58)	(-2.69)	(-7.81)	(-7.70)
deficits	0.014***	0.012***	-0.001	-0.001	0.020***	0.018***
	(3.54)	(3.12)	(-0.12)	(-0.16)	(3.71)	(3.36)
Constant	0.458***	0.455***	0.276***	0.275***	0.497***	0.499***
	(42.57)	(40.25)	(14.91)	(14.23)	(40.92)	(39.81)

Observations	16,407	16,407	2,678	2,678	13,729	13,729
R-squared	0.119		0.193		0.121	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0	0	0	0
r2_a	0.118	.	0.191	.	0.121	.
F	74.90		29.99		60.19	.
Hausman test	441.7(0.00)		71.5(0.00)		309.2(0.00)	

Robust t-statistics in parentheses,*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates. Hausman test is using to examine the appropriateness of fixed effect model and random effect model; the p-value below 0.01 indicates that fixed effect model is more appropriate for this study.

Table 2.6. Leverage regression analysis with long-term debt

	All firms		IT firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Long debt	Long debt	Long debt	Long debt	Long debt	Long debt
tangi	-0.016	-0.005	0.079**	0.111***	-0.030*	-0.025*
	(-1.10)	(-0.38)	(2.35)	(3.76)	(-1.92)	(-1.83)
itangi	0.051	0.036	-0.068	-0.008	0.071	0.045
	(1.17)	(0.89)	(-0.74)	(-0.10)	(1.46)	(0.99)

sale	-0.029***	-0.030***	-0.004	-0.008	-0.033***	-0.033***
	(-8.43)	(-10.28)	(-0.38)	(-0.97)	(-9.18)	(-11.13)
profit	-0.073***	-0.094***	-0.101***	-0.107***	-0.066***	-0.086***
	(-4.12)	(-5.56)	(-3.33)	(-3.73)	(-3.20)	(-4.31)
tax	0.020***	0.026***	-0.031***	-0.028**	0.024***	0.028***
	(3.41)	(4.44)	(-2.63)	(-2.38)	(3.80)	(4.44)
tobinq	-0.004***	-0.004***	0.000	0.000	-0.005***	-0.005***
	(-5.59)	(-6.04)	(0.42)	(0.13)	(-6.10)	(-6.20)
dr	-0.000	-0.000	-0.002	-0.002	-0.000	-0.000
	(-0.25)	(-0.34)	(-0.80)	(-1.07)	(-0.24)	(-0.11)
Constant	0.100***	0.097***	0.045***	0.042***	0.113***	0.112***
	(22.73)	(20.75)	(6.14)	(5.77)	(22.23)	(20.84)
Observations	16,407	16,407	2,678	2,678	13,729	13,729
R-squared	0.032		0.044		0.040	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0.00507	2.57e-05	0	0
r2_a	0.0318	.	0.0411	.	0.0399	.
F	20.29		3.001		21.38	.
Hausman test	Chi-sq=165.6	P=0.00	Chi-sq=33.8	P=0.00	Chi-sq=116.00	P=0.00

Robust t-statistics in parentheses,*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates. Hausman test is using to examine the appropriateness of fixed effect model and random effect model; the p-value below 0.01 indicates that fixed effect model is more appropriate for this study.

2.5.4 Leverage Level Regression Analysis

Although the traditional pecking order theory is failed to apply on Chinese firms, it is still necessary to check the determinants of the leverage level. The conventional regression tests are intended to explain the level of leverage. The dependent variable in these regressions test is the book value of gross debt and the book value of total long-term debt. The findings are reported in Table 5 and 6

Overall, the empirical findings obtained from the above tables indicate that the coefficients of tangibility, log of sale, profit, Tobin's Q, and deficits are significant for the total leverage regression. The coefficients of log of sale, profitability, tax rate, Tobin's Q are significant for the long-term debt. The more specific findings are concluded that:

For IT firms:

1. There are positive relationships between tangible assets and both of debts
2. No relationships between intangible assets and both of debts
3. Positive relationship between log of sale and gross debt, but no relation with long term debt
4. Negative relationships between profits and both of debts
5. Negative relationships between effective tax rate and both of debts
6. Negative relationship between Tobin's Q and gross debt, but no relation with long term debt.
7. The are no relationships between deficits and both of debts.

For Manufacturing firms:

1. The relationships between tangible assets and gross debt is not significant, while the effects on long-term debt is negative at 10% significant level.
2. There is no relationship between intangible assets and both of debts.
3. The log of sale has a positive impact to gross debt but negative influence on long term debt

4. Negative relationship between profits and both of debts.
5. A positive relationship between tax rate and long-term debts
6. Negative relationships between Tobin's Q and both of debts
7. A positive relationship between deficits and gross debt.

Also, it is noteworthy that most of the absolute values of coefficients in Gross debt that include large portion of short-term debt are much higher than the values in long-term debt; this is the further proof of the dominance of short-term liabilities in the debt structure in Chinese corporate.

Consistent with the existing literature findings, the relationship between profitability and debts is negative in Chinese firms. The coefficients on gross debt are -0.472 and -0.646 for IT and manufacturing firms, respectively, which are much larger than the coefficients of all other variables. Also, the profitability is significant at the 1% level in all situations. These findings further validate the previous studies' prediction that profitability is the most crucial determinants of Chinese firms' capital structure decisions. According to trade-off theory, the tax should have a positive influence on the debt level. However, the impact of tax to capital structure for Chinese firms is not as apparent as the profitability. At both gross debt and long-term debt, the tax effects are found to be negative and significant for IT firms, with coefficients of -0.068 (10% level) and 0.031, which means the IT firms' total leverage level will be slightly decreased with the increase of tax; this is contrary to the trade-off theory. For manufacturing firms, there is a positive relationship between tax and long-term debt, with coefficients of 0.024. intuitively, the result of tax on manufacturing firms seems to support the trade-off theory. However, the average ratio of long-term debt of manufacturing firms is only 7.5%, and half of those firm's long-term debt level are below 3.75%; this is much lower than other countries (18.4% on US-listed firms, 18% on Canadian listed firms). Therefore, the tax-shield provided by long-term debt seems not that attractive to Chinese listed firms.

Several reasons cited by Chen (2003) about why Chinese companies are reluctant to take on long-term debt are still instructive. Firstly, the Chinese bond market is still

underdeveloped compared with mature economies like the US and UK. Therefore, the companies have to undertake more risky costs that could be even higher than cost incurred on equity financing. Secondly, the substantial capital gains in secondary markets encouraged many listed companies to do equity financing. Thirdly, the Chinese market economy is under controlling of the government, the tax benefits of firms are limited by the authorities, which induce firms to finance with equity. To sum up, these findings further reject the traditional pecking order hypothesis. For Chinese listed firms, long-term debt has been used as the last resort. Therefore, pecking order hierarchy of Chinese capital structure should be: retained profit, then equity funding, then short-term debt, and lastly, long-term debt.

Tangibility assets are positively and significantly related with both leverage measures for IT firms, with coefficients of 0.271 and 0.079. The findings are similar to previous studies. As tangibility is an important criterion in bank's credit policy, firms with high tangibility thus are easier to get debt from bank. The tangible assets can also be used as the collateralization for debt to reduce the default risk, and the lenders are thus more willing to negotiate with those firms with high tangible assets. Additionally, some agency costs might be caused by asymmetric information, but the debt secured by tangible assets can reduce these costs. We only found a negative relationship between long-term debt and tangible assets at 10% level for manufacturing firms. This finding suggests the manufacturing firm with more tangible assets tend to face lower asymmetric information costs; they thus are attracted to the equity financing with fewer bindings.

The log of sale has been used as a proxy of size of firms. Previous literature shows us an unclear relationship between size and leverage level. Frank and Goyal (2003) argued that large firms with good reputation typically face lower borrowing costs, their capital structure thus tends to be more leveraged. The findings suggest that the relationship between size and gross debt is positive for each industry, which is similar to the previous studies. However, according to pecking order theory, large firms are less affected by asymmetric information; they thus have lower debt level. The results expressed in the long-term debt table give us an insignificant relationship on IT firms

and a negative relationship on the manufacturing firms. When the firm size measured by log of total assets, the relationship between gross debt and firm size turns to be negative for IT firms, which is difference with the results of sales. Additionally, when we use illiquidity ratio as proxy of asymmetric information, only a negative relationship between long-term debt and asymmetric information on manufacturing firms. To sum up, the results of asymmetric information's influence is ambiguous on those Chinese listed firms, this could also be why pecking order theory fails to explain the capital structure of Chinese firms, as the asymmetric information is the core of the theory.

As in Myers (1977), the debt overhang could negatively impact the future investments of firms. In our findings, the growth rate apparently has a negative relationship with the gross debt level for both industries, with coefficients of -0.006 and -0.02, respectively. The results are consistent with the study of Barclay *et al* (2001) and Goyal *et al* (2002). Additionally, for manufacturing firms, there is a negative relationship between growth rate and long-term debts, which is different from Chen (2003) finding.

2.5.5 Debt Overhang and Future Investments

As Myers (1977) mentioned, the increasing of leverage could cause the problem of debt overhang, which could impose the financial pressure on firms in near future; their future investments thereby could be curtailed. We explicitly test how the change in long-term debt and short-term debt impact the change in future investment. Our empirical findings are presented in the Table7 and 8.

Table 2.7 reports the regression results of short-term debt as dependent variables. The results show that the short-term debt has a significant and negative impact on the future investments for manufacturing firms, with the coefficients of -0.224. The work suggests that 1% increases in short-term debt could reduce future investments by 22.4%. This evidence is consistent with Diamond and He (2014) 's prediction, who

argued that the short-term debt would significantly reduce future investments. There is only a negative relationship for IT firms at the 10% level under the random effect model. The Hausman test here suggested that the fixed effect model is more appropriate; therefore, the short-term debt can be seen as no effect on future investments for IT firms. This is significantly different from the most previous studies, to our knowledge. The findings of the effect of cashflow on future investments are positive and significant in both industries, which is consistent with most previous studies. The firms with sufficient funding probably will seize the investment opportunities to expand their business. Moreover, the Tobin's Q are also appeared to be positive to future investments for all firms, which means the firms with higher growth opportunities tend to do more future investments. Additionally, the lagged sales are found to be no association with the future investments for both industries, which is different from Aivazian *et al* (2005) results.

Table 2.8 shows the results of long-term debt as dependent variables. Except for the results of the relationship between long-term debt and future investments, all the findings of other variables are similar to the findings shown in table 7. Contrary to the previous studies, there is no relationships between long-term debts and future investments for those Chinese listed firms. The most likely reason is that the long-term debts is the last choice of Chinese listed companies. As the long-term debt has always been a last resort, it thus just occupied a very small part of the capital structure. In summary, the impact of debt overhang on future investments for Chinese companies is significantly different from other areas, such as the US, EU, and Canadian. The main reason could be that most Chinese firms tend to raise funds by using retained profit or equity finance, especially for those new technology companies.

Table 2.7. Results of short-term debt overhang

	All Firms		IT Firms		Non-IT Firms	
	Fixed	Random	Fixed	Random	Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	capex	capex	capex	capex	capex	capex
Cashflow	0.191***	0.217***	0.263***	0.309***	0.171***	0.191***
	(7.44)	(8.90)	(3.59)	(4.62)	(6.45)	(7.63)
Short.Debt	-0.191***	-0.207***	-0.032	-0.083*	-0.224***	-0.229***
	(-9.27)	(-11.88)	(-0.55)	(-1.69)	(-10.27)	(-12.35)
TobinQ	0.013***	0.013***	0.020***	0.020***	0.010***	0.010***
	(7.35)	(7.29)	(5.78)	(5.53)	(5.29)	(5.45)
Sale	0.010	0.015**	0.024	0.030	0.006	0.013**
	(1.21)	(2.17)	(0.73)	(1.00)	(0.73)	(2.02)
Constant	0.166***	0.173***	0.097***	0.115***	0.187***	0.187***
	(13.90)	(15.75)	(3.51)	(4.36)	(14.70)	(15.83)
Observations	15,359	15,359	2,470	2,470	12,889	12,889
R-squared	0.044		0.047		0.048	
Number of code	1,047	1,047	208	208	839	839

F test	0	0	1.04e-08	0	0	0
r2_a	0.0433	.	0.0459	.	0.0478	.
F	54.50	.	11.88	.	47.66	.
Hausman test	Chi-sq=45.6	P=0.00	Chi-sq=19.6	P=0.00	Chi-sq=31.6	P=0.00

Robust t-statistics in parentheses,*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

Table 2.8. Results of long-term debt overhang

	All Firms		IT Firms		Non-IT Firms	
	Fixed	Random	Fixed	Random	Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	capex	capex	capex	capex	capex	capex
Cashflow	0.191***	0.217***	0.263***	0.309***	0.171***	0.191***
	(7.44)	(8.90)	(3.59)	(4.62)	(6.45)	(7.63)
Short.Debt	-0.191***	-0.207***	-0.032	-0.083*	-0.224***	-0.229***
	(-9.27)	(-11.88)	(-0.55)	(-1.69)	(-10.27)	(-12.35)
TobinQ	0.013***	0.013***	0.020***	0.020***	0.010***	0.010***
	(7.35)	(7.29)	(5.78)	(5.53)	(5.29)	(5.45)
Sale	0.010	0.015**	0.024	0.030	0.006	0.013**
	(1.21)	(2.17)	(0.73)	(1.00)	(0.73)	(2.02)
Constant	0.166***	0.173***	0.097***	0.115***	0.187***	0.187***

	(13.90)	(15.75)	(3.51)	(4.36)	(14.70)	(15.83)
Observations	15,359	15,359	2,470	2,470	12,889	12,889
R-squared	0.044		0.047		0.048	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	1.04e-08	0	0	0
r2_a	0.0433	.	0.0459	.	0.0478	.
F	54.50	.	11.88	.	47.66	.
Hausman test	Chi-sq=45.6	P=0.00	Chi-sq=19.6	P=0.00	Chi-sq=31.6	P=0.00

Robust t-statistics in parentheses,*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

2.6 Conclusion

Over recent decades, the capital structure decision has been a focal point of various theoretical and empirical studies. While the pecking order theory's hierarchy has been extensively tested in much literature, most studies have concentrated on mature markets like the U.S. and Canada. Given China's status as the second-largest world economy, the distinctive characteristics of its market, shaped by its central planned-market economy idiosyncrasies, have increasingly drawn global investors' attention.

This paper utilizes panel data from 1047 Chinese listed firms from 2000 to 2018 to test the pecking order model, analyze the determinants of capital structure, and evaluate the impact of debt on future investments. The empirical results indicate that the financing behaviors of Chinese firms significantly differ from those in the U.S. or Canada. Our findings are robust across alternative models and variable measurements. Both fixed and random effect models were applied, with the Hausman test confirming their appropriateness. In the pecking order test, we used gross debt change and long-term borrowing as dependent variables. For conventional regression analysis, we considered multiple variables to ensure robust results for core factors, including asymmetric information and profitability measures. In the debt overhang test, our findings are robust to two dependent variables, the net investment ratio, and the capital expenditure ratio.

Our study challenges the traditional hierarchy of the pecking order theory in the context of Chinese firms. Contrary to its predictions, we found long-term debt is often the last resort for covering funding shortfalls. Furthermore, short-term debt predominates the debt structure in these firms. The pecking order for Chinese companies appears to be: retained profit, equity finance, short-term debt, and finally, long-term debt.

In examining capital structure determinants, we considered profitability, asymmetric information, tangibility, growth ratio, tax, and financial deficits. Profitability emerged

as the most critical determinant, suggesting Chinese firms prefer using retained profit for business continuity, regardless of industry. The influence of asymmetric information was ambiguous, especially for large firms, while the impact of tangibility varied between IT and manufacturing firms. Our findings also challenge the trade-off theory's predictions regarding tax benefits and debt, and highlight that financial deficit significance varies based on the type of debt.

Investigating the impact of debt on future investments, we found that short-term debt negatively affects future investments in manufacturing firms, with no clear relationship observed between long-term debt and future investments for most firms. This finding aligns with Diamond and He's (2014) prediction regarding short-term liabilities and contrasts with Myers's (1977) assertion about short-term debt boosting future investments.

This paper lays the groundwork for exploring the debt overhang and future investments in Chinese companies. Future research could examine how investments might affect current leverage decisions and delve deeper into the debt overhang in IT and technology firms. As Chinese markets mature, the role of intangible assets warrants further study, as does the relationship between future investments and equity ownership, given the less significant influence of leverage on Chinese firms.

Chapter3
Reversed Debt Overhang?
The Impact of Expected Future Investment on Debt Structures

Abstract

This study explores the link between future investment levels and debt structure choices in U.S. listed companies (excluding finance, bank, insurance, utility, and government sectors). Using a cross-sectional model, we assess predictors of future investment levels like Tobin's q, cash flow, and ROE. The impact of these factors on debt structure decisions, particularly short-term debt, is found to be positive and significant. However, no substantial effect on long-term debt issuance is observed. The study also differentiates between expansion and recession periods, noting that expected investment factors positively influence debt issuance during expansion, but this trend reverses in recession periods. Additionally, a firm's growth factor negatively affects debt issuance during expansion but positively during recession.

Keywords: debt overhang, future investment, economic cycle, capital structure.

3.1 Introduction

This paper investigates into the nuanced relationship between a firm's leverage ratios and changes in its expected investment level, set against the vibrant backdrop of the U.S. business environment. Characterized by competitive markets, innovation-driven industries, and robust financial systems, the U.S. corporate landscape is a crucible of dynamic financial strategies. Ranging from agile start-ups to established multinational giants, U.S. companies navigate a high-stakes arena where technological evolution, shifting consumer trends, and the unpredictability of international trade and policy exert a profound influence on financial decision-making, especially in leveraging and investment strategies. The U.S. economy, oscillating between periods of expansion and contraction, plays a critical role in determining corporate financial health. Economic downturns, exemplified by the 2008 financial crisis and the recent COVID-19 pandemic, often tighten credit markets, dampen consumer spending, and foster a climate of economic uncertainty. Conversely, growth phases are marked by bolstered consumer confidence, escalating investments, and enhanced access to credit. These economic fluctuations exert a direct impact on corporate debt management and investment choices, shaping the framework within which firms calibrate their leverage and capital allocation strategies.

In this context, the issue of debt overhang emerges as a significant challenge for many U.S. firms. Debt overhang occurs when a company's existing debt burden is so considerable that new profits or external financing are primarily allocated to servicing this debt, severely limiting the capacity for new investments. This challenge is particularly pronounced in sectors where rapid technological change and intense competition necessitate continuous investment. Consequently, the presence of debt overhang can significantly restrict a firm's ability to embark on new projects or adopt emerging technologies, even if these ventures promise considerable returns.

The expected investment level of a firm is not determined by a single factor but rather emerges from a complex interplay of diverse influences, including economic conditions, industry-specific factors, regulatory landscapes, strategic imperatives, and

global trends. As Myers (1977) highlighted, internal factors such as a firm's risk appetite, financial stability, and long-term strategic objectives are crucial in understanding expected investment levels. Companies with robust balance sheets and ample cash reserves are generally more disposed towards pursuing growth opportunities. In contrast, firms facing financial constraints might prioritize efficiency and cost-saving measures. This strategic orientation, whether geared towards market expansion, diversification, or consolidation, is a decisive factor in shaping investment decisions. Echoing Aygunes (2017), macroeconomic factors like GDP growth, interest rates, inflation, and employment rates significantly influence investment decisions. In phases of economic growth, firms often exhibit an aggressive stance towards investment, spurred by heightened consumer demand, improved earnings, and easier capital access. However, during periods of economic instability or recession, a more conservative approach prevails, with companies scaling back on investments to concentrate on maintaining balance sheet resilience and ensuring cash preservation.

Myers (1977) posited that heightened leverage could lead to a 'debt overhang' problem, exacerbating a firm's financial burden and consequently diminishing its capacity for future investments. To counter this, he suggested the use of short-term debt as a mitigative measure against the adverse interplay between debt overhang and investment prospects. However, this perspective was later challenged by Diamond and He (2014), who contended that short-term liabilities could significantly amplify financial strain over a brief period, thereby impairing a firm's ability to invest in the future.

Our study seeks to provide empirical evidence supporting Myers' (1977) assertions, particularly regarding long-term debt. Previous research, including studies by Lang, Ofek, and Stulz (1996), Aivazian, Ge, and Qiu (2005), and Cai and Zhang (2011), has consistently identified a negative correlation between long-term debt and future investments. Notably, existing literature primarily focuses on how debt overhang affects future investment levels, with scant attention given to how anticipated investments might influence a firm's current debt levels. Additionally, the impact of economic cycles on capital structure decisions remains underexplored. In addressing

these gaps, our study embarks on three major tasks:

1. Identifying the factors that drive expected investment levels.
2. Investigating the influence of expected investment on a firm's debt overhang.
3. Examining the relationship between capital structure and business cycle.

Drawing inspiration from Hou's (2018) q-factor model, our study conducts cross-sectional regressions involving Tobin's q (Q), free cash flow, and changes in return on equity (ROE) to enhance the estimation of the expected investment factor. In alignment with Hou's findings, our empirical analysis reveals that both cash flow and changes in ROE serve as robust predictors of future investment levels, applicable in both the short-term and medium-term (1-3 years ahead) contexts. Interestingly, while Tobin's Q proves to be a significant indicator in the short-term, its predictive validity does not extend to longer-term investment forecasts.

Contemporary research has extensively investigated the determinants of firms' capital structure. Sunder and Myers (1999) introduced a pecking order model to assess whether companies opt for debt issuance to address their financial shortfalls. Their model posits that firms typically resort to debt financing to meet their anticipated deficits, suggesting that the pecking order theory provides a compelling approximation of firms' financing behavior. Furthermore, various studies (Lemmon and Zender (2002), Frank and Goyal (2003), Chang and Chen (2014), Mustaruddin et al. (2017)) have indicated that debt levels are influenced by factors such as profitability, growth ratio, asset tangibility, sales volume, and the presence of asymmetric information. However, as Ruah and Sufi (2011) noted, many empirical studies on capital structure tend to overlook the heterogeneity of debt types. Inspired by this observation, our study employs cross-sectional regression to dissect the impact of expected investment on different debt categories: total debt, long-term borrowings, and short-term borrowings. Contrary to the assertions of Diamond and He (2012), who argued that short-term debt overhang significantly curtails a firm's investment capacity, our findings reveal a nuanced scenario. We observed that long-term debt is positively influenced by future investment levels, aligning with Zhang's (2022) perspective, which advocates for long-

term debt as a preferred means of securing investment funds.

Beyond the parameters outlined in trade-off theory and pecking order theory, business cycle risks have emerged as critical determinants of a firm's capital structure. Levy and Hennessy (2007) sought to elucidate why firms respond diversely to macroeconomic shocks, particularly under varying financing constraints. They observed that during economic expansions, firms exhibit a preference for equity financing over debt. Conversely, in recessionary periods, firms tend to increase their debt uptake to preserve their equity share. This observation underscores the adaptive strategies firms employ in response to economic cycles. Lemmon et al. (2008) further illuminated this area, pointing out that traditional variables such as size, profitability, asset tangibility, and cash flow volatility do not comprehensively account for the variations observed in leverage ratios. Their research suggests the presence of time-invariant factors that exert a significant impact on leverage levels. This idea is reinforced by Akhtar (2012), who posited that capital structure decisions are indeed influenced by the economic cycle.

Our study significantly advances understanding of how expected investment level fluctuations affect current debt levels. We find that anticipated future investments typically reduce current total debt levels, echoing theories advocating for cautious debt accumulation in light of future investments. Consistently with Diamond and He's (2014) findings, we observe an inverse relationship between expected investment levels and short-term debt in recessions, indicating firms' propensity to lower short-term liabilities amid market uncertainties. Contrary to previous studies linking debt overhang with reduced long-term debt, our results show a positive correlation during expansion phases, supporting the pecking order theory. Moreover, the MB ratio negatively impacts debt issuance in expansions (trade-off theory) and positively in recessions (pecking order theory), aligning with Frank and Goyal's (2009) observations. Lastly, there's a positive link between future investments and short-term debt in expansions, but a negative association with both short-term and long-term debt during recessions.

Our study offers fresh perspectives on capital structure decisions, enriching the existing body of knowledge in this field. The remainder of the paper is systematically structured for clarity and coherence. Section 2 is Literature Review. This section delves into the existing research and theoretical frameworks that form the backdrop of our study, providing a comprehensive overview of the current understanding of capital structure decisions. Section 3 discusses the data and hypothesis. Here, we outline the data sources utilized in our analysis and articulate the hypotheses underpinning our research, setting the stage for the subsequent empirical investigation. Section 4 performs the cross-sectional analysis to construct the expected investment factor. Section 5 is empirical results analysis. In this part, we rigorously analyze the impact of the expected investment factor on different levels of debt, offering empirical insights into how investment expectations influence debt strategies. Section 6 presents the robustness check and limitations of this study. Finally, section 7 synthesizes the insights garnered from the study, summarizing the key findings and contributions, and suggesting avenues for future research in this domain.

3.2 literature review

Myers (1977) presents a groundbreaking perspective on corporate finance, particularly focusing on how corporate assets, especially growth opportunities, can be likened to call options. The value of these 'real options' hinges on the firm's discretionary future investments. The author introduces a critical insight into the impact of risky debt on a firm's market value, highlighting that such debt issuance can diminish the firm's value. This reduction occurs either through the induction of suboptimal investment strategies or by imposing the costs of avoiding these suboptimal strategies on the firm and its creditors. A key prediction from this paper is the inverse relationship between corporate borrowing and the proportion of a firm's market value represented by real options. Additionally, Myers' work sheds light on various aspects of corporate borrowing behavior, such as the common practice of matching the maturities of assets and debt liabilities. This paper contributes significantly to the understanding of corporate borrowing decisions, emphasizing the influence of growth opportunities and investment strategies on a firm's financial structure.

Stulz (1990) examines the influence of financing policies on investment decisions within firms, particularly addressing the agency problem arising from the separation of ownership and management. The study focuses on firms with atomistic shareholders who are not privy to the firm's cash flows or investment decisions. Central to the analysis is the concept of managerial discretion and how it impacts investment behavior. The author highlights a scenario where management, motivated by perquisites derived from investment, has a propensity to invest as much as possible. This tendency leads to a situation where management invariably claims insufficient cash flows to fund all positive net present value (NPV) projects. This claim, however, loses credibility in instances of genuinely low cash flow, resulting in underinvestment. Conversely, when cash flow is high, management tends to overinvest.

Jensen (1986) highlights how debt can be instrumental in lowering the agency costs associated with free cash flows. The study explores the role of debt as an alternative to dividends, serving a similar purpose in capital structure decisions. Also, the author points out that diversification programs often result in more losses compared to takeovers, expansions within the same business line, or takeovers motivated by liquidation. Further, the paper also examines why takeover activities in varied industries like broadcasting and tobacco share similarities with those in the oil industry. Additionally, it observes that bidders and some targets in takeover scenarios often exhibit exceptionally good performance prior to the takeover event. The study emphasizes how financing policies can be instrumental in balancing this skewed investment behavior. By influencing the number of resources under management's control, financing policies can mitigate the extremes of over- and underinvestment. This insight contributes significantly to the understanding of how capital structure decisions can be utilized as a strategic tool to align managerial actions with shareholder interests.

Kaplan and Zingales (1997) challenge conventional interpretations of investment-cash flow sensitivities as indicators of financing constraints. The study reexamines firms identified by Fazzari, Hubbard, and Petersen as exhibiting unusually high investment-

cash flow sensitivities. Contrary to established views, the authors find that firms appearing less financially constrained actually display greater sensitivities than those seeming more constrained. This pattern persists across the entire sample period, including subperiods and individual years. Their findings significantly question the common assumption that higher investment-cash flow sensitivities are indicative of greater financial constraints. This challenges the validity of prior research methodologies that rely on this assumption. Kaplan and Zingales' results suggest that such sensitivities may not reliably signal a firm's financial limitations, thereby prompting a reevaluation of how these sensitivities are interpreted in the context of corporate finance research.

Erickson and Whited (2000) critically reevaluate the relationship between investment and the q-theory in the context of financially constrained firms. Their research addresses a key anomaly in empirical investment studies: the significant responsiveness of investment to cash flow in firms perceived as financially constrained, which stands in contrast to the theoretical expectations of the q-theory of investment. This theory posits that the marginal q should encapsulate all factors pertinent to investment decisions, yet empirical findings consistently highlight the relevance of cash flow. The authors explore the possibility that these contradictions arise from measurement errors in determining marginal q. Utilizing generalized method of moments estimators that are consistent with measurement error, they reassess the relationship between investment and q. Their findings are revelatory: many of the accepted conclusions drawn from investment-q cash flow regressions are, in fact, artifacts resulting from measurement errors. Contrary to the prevailing belief, they find that cash flow does not significantly impact investment decisions, even in firms that are financially constrained. This research profoundly alters the understanding of the q-theory's efficacy. Once the measurement error is accounted for, the q-theory demonstrates robust explanatory power, challenging the prior consensus about its limited applicability, especially in the context of financially constrained firms. This study not only questions existing empirical methodologies but also reinstates the q-theory as a potent tool for understanding investment behaviors across different financial contexts.

Levy and Hennessy (2007) presents a detailed examination of how macroeconomic conditions influence corporate capital structure decisions. This investigation delves into why companies choose varying mixes of debt and equity in response to economic changes. Central to their analysis is a computable general equilibrium model that incorporates two significant agency problems prevalent in corporate finance: managerial misreporting of earnings to misappropriate resources from shareholders and asset diversion by managers, detrimental to bondholders. To combat these issues, the model introduces constraints such as a minimum equity share for managers and a maximum leverage ratio, ensuring managerial commitment against resource diversion. The study reveals that during economic downturns, firms are more likely to replace equity with debt to maintain managerial equity shares. Conversely, in times of economic expansion, the preference shifts towards equity over debt, driven by better risk-sharing and increased managerial wealth. This dynamic is particularly evident in firms with fewer financing restrictions, which show a counter-cyclical trend in leverage ratios and a pro-cyclical pattern in equity issuance. These findings are supported by calibrated simulations within the model, aligning with real-world empirical evidence.

The research also highlights the impact of managerial wealth on financing decisions. As managerial wealth increases, it relaxes equity constraints, allowing for easier substitution of external equity for debt. This shift significantly affects investment patterns, especially during economic contractions, where firms with severe agency problems experience a more pronounced decline in investment. This aspect is particularly acute for smaller, bank-dependent firms. Overall, study concludes by stressing the macroeconomic importance of investor protections. They argue that stronger investor protections can contribute to greater macroeconomic stability by lessening the impact of financial accelerator effects. Overall, this study stresses the macroeconomic importance of investor protections. They argue that stronger investor protections can contribute to greater macroeconomic stability by lessening the impact of financial accelerator effects. Overall, their model provides a comprehensive understanding of the interplay between capital structure choices and macroeconomic

conditions, emphasizing the role of managerial agency problems and financial constraints in these dynamics.

Lemmon and Zender (2008) examine the impact of integrating a measure of debt capacity in evaluating competing theories of capital structure. Their findings contribute significantly to the understanding of corporate finance in several key areas. Firstly, their study finds that internally generated funds are the preferred source of financing across firms. This aligns with the pecking order theory, which posits that firms prioritize internal financing over external sources. Secondly, In situations where external funds are required and debt capacity is not a concern, debt financing is favored over equity. This preference is in line with the pecking order theory but poses challenges to the tradeoff theory. further, this research uncovers that profitable, low-leverage firms with minimal transaction costs for issuing new securities tend to stockpile debt capacity. This behavior is consistent with the pecking order theory but difficult to reconcile with the tradeoff theory, which suggests a more balanced approach to debt and equity based on cost-benefit analysis. additionally, they also address the frequent equity issues observed in small, high-growth firms. They find that, when accounting for debt capacity, the pecking order theory remains a robust descriptor of financing behavior for a broad sample of firms over an extended period.

Rauh and Sufi (2010) conduct comprehensive analysis of corporate capital structure, particularly focusing on the diversity and dynamics of debt structures within firms. The research leverages a novel dataset that records individual debt issues on the balance sheets of public firms, offering a deeper understanding of how companies manage their debt portfolios. The study begins by emphasizing the importance of recognizing debt heterogeneity in capital structure studies. It categorizes corporate debt into various types like bank debt, bonds, convertible bonds, and others, revealing that most firms use a combination of these debt types. The authors argue that traditional studies, which often treat debt as a uniform entity, miss significant variations in capital structure. One of the key findings of the study is the variation in debt structure across firms with different credit qualities. The authors find that

compared to high-credit-quality firms, those with lower credit quality tend to have a more diversified or "spread" capital structure, including secured bank debt, unsecured senior debt, and subordinated issues. This finding aligns with theoretical models that suggest firms use multiple debt types to reduce incentive conflicts and manage risks. The study also examines the relationship between credit quality and changes in capital structure, using a dataset of "fallen angels" - firms downgraded from investment grade to speculative grade. The findings indicate that these firms experience significant shifts in their capital structure post-downgrade, increasing their reliance on both secured bank debt and subordinated bonds or convertibles.

This research contributes to the understanding of capital structure decisions by highlighting the importance of debt heterogeneity and its relationship with credit quality. It’s findings challenge the conventional wisdom in capital structure literature by showing that firms actively adjust the composition of their debt, not just the overall level. The study suggests that different types of debt serve distinct roles in a firm's capital structure, influenced by factors like credit quality, incentive conflicts, and the need for financial flexibility.

Morellec, Valta and Zhdanov (2014) investigate into the strategic choice between bonds and bank loans for financing corporate investments. Their innovative approach integrates investment decisions with financing choices, offering a comprehensive model that considers various corporate and market characteristics. Their key findings include how firms with substantial growth options, higher power in default negotiations, and those in competitive markets tend to favor bond issuance. On the other hand, firms constrained by credit availability lean towards bank loans. This selection is not just about financing but also influences when firms decide to invest. Factors like growth prospects, credit constraints, market competition, liquidation costs, and negotiation leverage in defaults can either expedite or delay these investment decisions. Through empirical analysis using U.S. firm data, the authors validate their model, finding consistent patterns in debt choices and investment timing. This research extends beyond traditional corporate finance studies by concurrently examining debt type and investment timing, providing a more nuanced view of how various factors

interact in shaping corporate financing and investment strategies. Overall, this study offers critical insights into the complexities of financing decisions, highlighting the multifaceted influences that drive the choice between bonds and bank loans, and ultimately, the timing of corporate investments.

Diamond and He (2014) explores the effects of debt maturity on corporate investment decisions in the context of debt overhang. It begins by analyzing the classic issue of debt overhang, where high levels of debt discourage profitable investments as the benefits partly accrue to debt holders. The authors delve into how short-term and long-term debts differentially impact investment incentives, considering various scenarios including immediate and future investments. They extend the analysis by incorporating state-dependent volatility, showing how fluctuations in firm value in different states can impact debt overhang. The paper provides a comprehensive theoretical framework, using examples and formal models, to understand the nuanced relationship between debt maturity and investment incentives, offering new perspectives on managing debt structure in corporate finance.

Aygunes (2017) explores the interplay between venture capital investments and various macroeconomic variables. the author employs a statistical computation method, specifically logistic regression, to analyze the correlation between these factors. The study surveys 18 countries, including Turkey, the United States, the United Kingdom, Canada, France, Germany, and several others, alongside eight macroeconomic variables such as Gross Domestic Product (GDP), GDP Growth, Inflation, Unemployment, Foreign Direct Investment, Stock Market Capitalization, Total Value Traded, and Credit. This diverse set of countries and variables provides a broad perspective on the topic. This study discovers significant correlations between these macroeconomic variables and venture capital investments. The research reveals that factors like the stock market's total value traded and credit have strong positive correlations, while others like GDP growth and credit show negative correlations. These findings suggest that the macroeconomic environment plays a crucial role in shaping venture capital investment landscapes across different countries. The study's conclusion emphasizes the varied nature of these correlations, classifying them into

three groups: positively very high, negatively low, and positively very low. This classification underlines the complexity of the relationship between venture capital investments and macroeconomic variables. Aygunes (2017) research contributes to the understanding of how macroeconomic conditions influence venture capital investments. By highlighting the intricate connections between various economic factors and venture capital activities, the study provides valuable insights for policymakers, investors, and entrepreneurs in developing strategies and making informed decisions in the venture capital sector.

Hou-Xue-Zhang (2018) extends the Hou-Xue-Zhang (2015) q-factor model with a new factor based on expected growth. This addition significantly enhances the model's ability to explain asset returns. The authors demonstrate that firms with higher expected growth, holding investment and expected profitability constant, tend to earn higher returns. They introduce the expected growth factor which exhibits a notable average premium and is robust across various tests. This factor outperforms other models, including the Fama-French six-factor model. The q5-model, which integrates this new factor, shows improved explanatory power across a wide range of financial anomalies, particularly in the investment and profitability categories. This work contributes significantly to asset pricing literature by highlighting the importance of expected growth in asset return variation and challenging existing models with a more comprehensive approach.

Gan-Xia-Zhang (2022) investigates the impact of heterogeneous debt structures on corporate financing and investment decisions. The authors utilize a dynamic trade-off model to study how the coexistence of bank and market debt influences corporate policies, especially in the context of debt overhang. They find that mixed bank and market debt financing can mitigate the negative effects of debt overhang on firm investment compared to structures with exclusive market debt. The study further explores how firms with growth opportunities tend to optimally adjust their debt composition, focusing on the balance between market debt's tax shield benefits and bank debt's bankruptcy and debt overhang cost reductions. The paper contributes to the understanding of optimal debt structures and their implications for corporate

investment and valuation, offering novel empirical predictions for future testing.

3.3 Description of data

3.3.1 Descriptive Statistics

The data sampling applied in this study is the Compustat North America Annual Fundamental items and Global Fundamental Annuals. These fundamental items contain various financial, market, and statistical information on the North American listed firms and Global Listed firms. The sample spans the years 1979 to 2021. Following the conventions of previous studies, all financial, utility, and government-sponsored firms (SIC Codes 4000-4999, 6000-6799, and 9100-9999) have been excluded. The firms with negative total asset value, the negative book value of equity and negative debt have also been ruled out, as their leverage ratios and other financial ratios tend to be anomalous. After data wrangling, an unbalanced panel of 56369 observations of 3353 firms (total) remained for regression analysis. The business cycle data are obtained from the National Bureau of Economic Research (NBER).

The traditional empirical studies on capital structure always treat debt uniformly, which may ignore the heterogeneity of debt. This study thus measures debt structure in four ways: short-term borrowings, long-term borrowings, and total debt, which are all scaled by the book value of total assets

Table 3-1 presents the descriptive statistics for leverage levels, investment, and various financial ratios of North American listed firms included in our study. Notably, the skewness value of 0.85 for Tobin's Q ratio indicates a moderately skewed distribution. This skewness implies that, although a significant number of firms cluster around the median value of 0.92, there exists a pronounced tail of firms exhibiting higher Tobin's Q values, which elevates the mean to 1.21, surpassing the median. It's important to interpret Tobin's Q, where a ratio exceeding 1 denotes a market valuation surpassing the firm's physical asset cost. This is often interpreted as the market's anticipation of

future growth and profitability for the firm. The median value, being slightly below but near 1, suggests that the bulk of the firms in our sample are appraised at around their asset replacement cost. However, there is a subset of firms that significantly exceed this benchmark, reflected in the higher mean value.

The cash flow ratio, a crucial metric for assessing a firm's ability to generate cash from its operations in relation to its total assets, serves as an important indicator of operational efficiency and financial health. This ratio, particularly higher values, is indicative of a firm's proficiency in translating its business activities into cash. In our analysis of nearly 3000 U.S. listed firms, the observed skewness value of -0.34 for the cash flow ratio points to a mildly negatively skewed distribution. This negative skewness reveals that while a significant portion of firms have their ratios closely bunched around the median value of 0.06, there exists a noticeable subset of firms with lower operating cash flow relative to total assets. These firms exert a downward pull on the average, resulting in a mean ratio (0.05) that is marginally lower than the median. Such a distribution pattern underscores the presence of a small but distinct group of firms with less efficient cash generation in comparison to their overall asset base.

ROE serves as an essential indicator of a company's profitability in connection to its equity. It essentially measures the efficacy with which a company employs its shareholders' equity to generate profits. As a rule of thumb, a higher ROE is often perceived positively, signaling efficient management and the potential for greater returns to investors. In our analysis of 3000 U.S. listed firms, the observed skewness value of -0.86 for ROE points towards a significantly negatively skewed distribution. This skewness conveys that while a considerable number of firms report ROE values at or above the median of 0.08, there exists a pronounced tail of firms with markedly lower ROE values. These firms with lower ROE are exerting a downward pull on the average, bringing the mean ROE to 0.05, which is noticeably below the median. It's noteworthy that the distribution pattern of Return on Capital Employed (ROCE) in our dataset mirrors the characteristics observed in ROE, suggesting similar trends in both profitability and capital efficiency among these firms.

The investment ratio, calculated as the sum of capital expenditure and R&D expense divided by total assets, serves as a crucial metric for gauging a company's investment intensity in relation to its asset base. This ratio offers insights into the proportion of a firm's assets that are being channeled towards capital expenditure and research and development, key drivers of growth and innovation. A higher investment ratio is typically indicative of a firm allocating a larger share of its assets to these growth-oriented activities. It's noteworthy that firms with significantly elevated investment ratios are likely in aggressive growth phases, prioritizing substantial investment in capital and R&D initiatives. On the other hand, firms with lower ratios might adopt a more conservative approach or be at different stages in their business lifecycle. In our analysis of 3000 U.S. listed firms, the pronounced disparity between the mean investment ratio (10%) and the median (6.3%) underscores the profound influence of outliers, as evidenced by a skewness value of 9.9. This stark contrast implies that while over half of the firms in our sample have investment ratios of 6.3% or less, the average is markedly higher due to a relatively small number of firms with disproportionately high investment ratios. This significant skewness in the distribution points to the presence of a subset of firms that are extensively investing in their growth and development, thereby elevating the overall mean investment ratio.

Sales turnover serves as a straightforward metric for gauging a company's operational size through its revenue. The distribution of sales turnover across 3000 U.S. listed firms reveals a diverse range of firm sizes. This is evidenced by the majority of firms recording moderate turnover levels, while a significant segment exhibits considerably higher sales. Such a pattern is characteristic of market landscapes where a handful of companies hold dominant positions. The dataset's mean sales turnover, slightly higher than the median (1 vs. 0.84), suggests the influence of outliers — firms with exceptionally high sales turnover. This is further substantiated by a notable skewness value of 3.9. However, the relative closeness of the mean to the median also indicates that the distribution, while right-skewed, isn't overwhelmingly controlled by these outliers, a scenario often observed in distributions with even higher degrees of skewness. These insights point to a market with a mix of both large, dominant players and a broader base of firms with more modest revenue scales

The operating profit margin, a key indicator of profitability, reflects a company's operational efficiency and its capability to turn sales into profits before considering interest and taxes. Generally, a higher operating profit margin is indicative of superior operational efficiency and effective cost management. In our analysis of 3000 U.S. listed firms, the skewness value of -0.58 reveals a mildly negatively skewed distribution of operating profit margins. This negative skewness highlights that while most of firms maintain operating profit margins around the median of 6.2%, there exists a significant segment of firms with lower margins. These firms with comparatively lower profitability exert a downward influence on the average, resulting in a mean operating profit margin of 5.3%, marginally below the median. This pattern suggests a diverse range of operational efficiencies among the firms, with a notable proportion facing challenges in converting sales into higher profit margins.

The Market-to-Book (MB) ratio, a crucial financial metric, assesses a company's market value in comparison to its book value. A higher MB ratio typically signifies that the market recognizes and values the firm's intangible assets and future growth prospects positively. This enhanced valuation often stems from factors like innovative capabilities, strong brand equity, effective management practices, or a dominant position in the market. In our analysis of 3000 U.S. listed firms, the skewness value of 0.745 reveals a moderately positive skew in the distribution of MB ratios. This indicates that while the majority of firms cluster around a median MB ratio of 1.8, there is a noticeable distribution tail comprising firms with significantly higher MB ratios. These firms, exhibiting higher than average MB ratios, exert an upward influence on the overall mean, elevating it to 2.24. This pattern reflects a diverse valuation landscape, where a subset of firms achieves notably higher market valuations relative to their book values, possibly due to perceived higher growth potential or other favorable market sentiments.

The total debt to total asset ratio within our sample of 3000 U.S. listed firms, averaging around 0.42-0.43, indicates that these firms generally maintain a moderate level of debt in relation to their assets. This ratio reflects a balanced financing strategy,

suggesting that firms are leveraging debt to a certain degree to capitalize on the benefits of leverage, yet they are careful not to overburden their balance sheets with excessive debt. The skewness value of -0.018, being very close to zero, reinforces the notion of a nearly symmetrical distribution for the total debt to total asset ratio. Such a near-zero skewness value implies an even distribution of data around the mean, lacking significant tails at either the lower or higher ends. This symmetry in distribution signifies that the observed moderate leverage is a consistent trend across the majority of these firms, rather than being driven by extreme values from a small subset of companies.

The short-term debt to total asset ratio is a key metric for assessing the proportion of a company's assets financed through short-term debt. It serves as an indicator of the firm's immediate financial obligations in relation to its asset base. A higher ratio typically implies a greater reliance on short-term financing, which can be indicative of various strategic approaches, such as aggressive growth strategies, or it might signal potential liquidity challenges. In our analysis of 3000 U.S. listed firms, the skewness value of 1.08 reveals a moderately positive skew in the distribution of this ratio. This positive skewness indicates that while the majority of firms exhibit short-term debt ratios around the median of 0.2, there is a noticeable tail composed of firms with higher ratios. Consequently, these firms with relatively elevated short-term debt ratios exert an upward pull on the mean, increasing it to 0.23, above the median value. The overall distribution pattern suggests that while most firms in the dataset maintain a moderate level of short-term debt, a distinct subset is characterized by higher short-term debt levels. This variation could reflect differing financial circumstances across these firms, ranging from more aggressive capital management and high operational turnover to scenarios of tighter liquidity.

The long-term debt to total asset ratio serves as a crucial indicator of a company's long-term financial strategy and its underlying debt structure. Typically, a higher ratio can indicate a firm’s greater reliance on long-term financing. This might be due to reasons such as substantial capital investments or a deliberate strategic choice in its financing approach. In our analysis of 3000 U.S. listed firms, the skewness value of 1.13 points

to a moderate to high positive skew in the distribution of this ratio. This skewness denotes that while the bulk of the firms in our dataset maintain long-term debt ratios at or below the median value of 0.11, there exists a noticeable proportion of firms with significantly higher ratios. These firms, exhibiting elevated levels of long-term debt relative to their assets, contribute to lifting the average ratio to 0.14, which is above the median. This distribution pattern suggests that the majority of firms have opted for a conservative to moderate approach in managing their long-term debt levels in relation to their asset base.

In our dataset, the observation that the short-term debt ratio is notably higher than the long-term debt ratio across a variety of firms can be attributed to several factors. Firstly, many firms demonstrate a preference for short-term debt due to its inherent flexibility in managing liquidity. Short-term loans are often utilized to meet immediate working capital requirements, address cash flow mismatches, or seize fleeting opportunities that arise. This preference underscores the strategic use of short-term financial instruments to maintain operational agility. Secondly, the business cycle stages significantly influence debt strategies. During phases of economic expansion, firms are likely to ramp up short-term borrowing to swiftly capitalize on emerging growth opportunities. This approach allows them to align their financing closely with their immediate expansion needs without committing to long-term obligations. Conversely, in times of economic downturns or recessions, long-term financing can become more challenging to secure, prompting firms to lean more heavily on short-term debt. This shift is often a tactical response to uncertain economic conditions and tighter credit markets. It's noteworthy that the majority of the time period covered in our dataset falls within economic expansion phases. This context likely contributes to the higher prevalence of short-term debt, as firms actively engage in leveraging short-term financial instruments to support their growth and operational strategies during these times of economic prosperity.

Table 3-1. Summary Statistics

Variables	S.Deviation	Mean	P50	Skewness
Tobin's Q	0.97	1.2135	0.923	0.87
Cash flow	0.09	0.05	0.06	-0.34
Roe	-0.86	0.05	0.08	-0.86
Roce	0.14	0.06	0.087	-0.671
Investment ratio	0.143	0.1	0.063	9.96
Size	0.8	1	0.84	3.9
Profitability	1.02	0.053	0.062	-0.58
MB-ratio	1.71	2.24	1.798	.745
Debt/asset	0.255	0.42	0.43	-0.018
s.debt/asset	0.206	0.23	0.20	1.08
l.debt/asset	0.015	0.14	0.11	1.13

The sample data consists of all the non-financial, non-utility and non-government firms that have positive book value of equity and non-negative book value of total liabilities, and are available from Compustat North America Annual Fundamental items during 1980-2021, totally of 3203 firms. The monthly variable has been winsorized at the 5-95% level at both the left- and right-hand side.

3.3.2 Description of variables and main hypothesis

3.3.2.1 Investment and Long-term borrowings

The previous discussions on the relationship between long-term debt and future investments are mixed. Myers (1977) suggests that escalating long-term debt levels could potentially suppress a firm's inclination to invest, attributing this to the increased burden of debt obligations. This proposition finds support in the empirical studies of Aivazian (2005) and Jie (2011), who both highlight a significant linkage between increased leverage and a subsequent decline in future investment, reinforcing Myers' theoretical framework.

Conversely, Zhang (2022) offers a contrasting view, proposing that long-term bank debt may act as a catalyst for anticipated investments. This concept is anchored in the idea that the renegotiable nature of bank debt could bolster the investment drive of equity holders, as it allows them to benefit from the surplus emerging from debt renegotiations with creditors. Additionally, the pecking order theory, which favors internal over external funding, suggests that firms lacking sufficient internal cash reserves are more likely to opt for debt financing to meet their investment aspirations.

Against this backdrop of diverse perspectives, our research adopts a unique position. We advocate for a positive correlation between projected investment activities and the existing levels of long-term debt within firms. This hypothesis is based on the premise that companies, in anticipation of future growth and opportunities for investment, may deliberately increase their leverage to strategically position themselves for these forthcoming endeavors. Our investigation seeks to delve into the nuances of this relationship, scrutinizing the influence of long-term debt on future investments.

H1: The expected investment will positively impact current long-term debt level.

3.3.2.2 Investment and Short-term borrowings

The relationship between investment and short-term debt is also ambiguous. Myers (1977) posited that short-term debt, with its quicker maturity, could preclude the issue of debt overhang, as it would be resolved before any investment decisions are made. Contrarily, Diamond and He (2011) presented a theoretical argument suggesting that short-term debt might, in fact, exacerbate a company's financial fragility. This effect becomes particularly pronounced during economic downturns, where the confluence of adverse market conditions and short-term liabilities can substantially diminish equity value, thereby eroding shareholders' incentives to invest. Empirical support for this viewpoint is provided by Moyen (2007) and Vu (2014), who both found that the burden of short-term debt overhang can have a deleterious impact on investment levels. Given these insights, it becomes apparent that companies contemplating near-term investments should maintain a more significant reserve of disposable free cash flow.

This strategy is essential to adequately cover imminent capital expenditures, especially in light of the potential constraints imposed by short-term debt obligations.

H2: The expected investment will negatively impact current short-term debt level.

3.3.2.3 MB-ratio, profitability, size, and debt level.

Growth in a firm increases the costs associated with financial distress, while simultaneously reducing debt-related agency problems, as highlighted in the context of growing firms' investment strategies. According to the trade-off theory, this suggests that growing firms should accumulate more debt. On the other hand, the pecking order theory posits a different view, implying that profitability and fixed leverage are positively correlated. Under this theory, firms are expected to prioritize internal financing over external debt.

The market-to-book asset ratio is widely recognized as a key indicator in these assessments, being the most commonly used metric, as Adam and Goyal (2008) have demonstrated. Additionally, they highlight its role as the most effective predictor in this context. However, it's important to note that the market-to-book ratio's influence on corporate financial decisions might also be subject to the effects of stock mispricing. In the realm of financial decision-making, a higher market-to-book ratio is typically associated with a reduced reliance on debt, given the preference for equity issuances. This preference stems from a mechanical market-based definition of leverage. Supporting this notion, Frank and Goyal (2009) found that the market-to-book ratio is negatively related to debt levels, further substantiating the link between market valuation and corporate leverage strategies.

Frank and Goyal (2009) also contribute to this discourse by demonstrating a negative correlation between profitability and leverage in a dynamic trade-off model. According to the trade-off theory, larger firms, which typically enjoy better credit quality, face lower agency costs associated with debt. Additionally, their diversified

nature reduces default risk, making it more feasible for these firms to carry higher levels of debt.

Drawing on these insights, this study posits the following assumptions: Larger firms, due to their reduced risk and lower associated costs of debt, are likely to have higher leverage ratios. This trend is further reinforced by the tendency of profitable firms to rely more on accumulated earnings than external financing, indicating a nuanced relationship between a firm's financial stability, its size, and its approach to leveraging debt. These assumptions aim to shed light on the strategic financial decisions that firms make in response to their immediate and long-term funding needs.

H3: MB-ratio is inversely related to debt level

H4: Profitability will negatively impact the debt level.

H5: Size of firm is positively related to its debt level

3.3.2.4 Economic cycle and capital structure

This study investigates into the intricate dynamics between business cycles—encompassing both recession and expansion—and the influence of capital structure on future investment. Lemmon et al. (2008) discovered that conventional variables like firm size, market-to-book ratio, profitability, initial leverage, industry median, asset tangibility, and cash flow volatility do not fully account for the variations in leverage ratios, especially when firm-specific fixed effects are taken into consideration. They posited that a significant portion of the variance in leverage is attributable to an unobserved, time-invariant factor, casting doubts on the accuracy of previous models that neglected this aspect. While recognizing the importance of the factors behind the persistent stability of leverage ratios, Lemmon et al. (2008) did not explore these elements in depth.

Building upon this groundwork, Akhtar (2012) integrates business cycle variables to

further elucidate capital structure nuances. Akhtar suggests that the business cycle might elucidate the unobserved time-invariant aspect of leverage ratios for two primary reasons. Firstly, different stages of the business cycle exhibit a partly time-invariant characteristic, hinting at a potential correlation between leverage ratios and business cycles. This suggests a tendency for these variables to move synchronously towards a long-term equilibrium. Secondly, given the temporal nature of business cycles and Lemmon et al.'s (2008) efforts to address time-related capital structure issues, it appears rational to consider business cycle phases as a potential key to unlocking the enigma of capital structure determinants.

According to Akhtar (2012), the business cycle markedly influences capital structure decisions. Notably, during contraction phases, profitability exhibits a clear negative effect on debt structure, while firm size and tangible assets tend to have a positive impact. Echoing these findings, Merika (2015) examined the shipping industry and corroborated the negative correlation between leverage and profitability during contraction phases. This study, however, observed that all other variables also negatively influenced the leverage ratio, diverging from previous research. Additionally, it identified a positive relationship between profitability and leverage in expansion stages. Thus, this paper contributes to the understanding of how different phases of the business cycle can distinctly affect capital structure decisions in various industries. Based on these previous findings, we set the hypothesis of the economic cycle and capital structure as below:

H7: During expansion, there is a positive relationship between expected investment and both of long-term borrowing and short-term borrowing

H8: During recession, there is a negative relationship between expected investment and debt issuance.

3.4 Expected investment factor

In constructing a factor to predict changes in expected investment, our methodology

aligns with that of Hou (2014), who utilized Fama-MacBeth (1973) cross-sectional regressions. This approach involved analyzing variables such as Tobin's Q, free cash flow, and variations in Return on Equity (ROE) to forecast future investment trends.

Tobin (1969) theorized that firms with a market value-to-replacement cost ratio exceeding one are more likely to engage in additional investment. This concept is supported by Aivazian (2005), who identified a significant positive correlation between Tobin's Q and investment sensitivity. Our computation of Tobin's Q mirrors the approach of Kaplan and Zingales (1997), encompassing market equity, short-term debt, and long-term debt, and then normalizing these by book assets.

Beyond Tobin's Q, internal cash flows are also recognized as critical determinants of future investment sensitivity. Studies by Lang (1996), Erickson and Whited (2000), and Aivazian (2005) have highlighted a robust link between cash flows and shifts in investment. We employ the free cash flow to the firm as our cash flow metric, calculated as Earnings Before Interest and Taxes (EBIT) minus tax expenses, added to depreciation and amortization, then subtracting both fixed asset investment and working capital investment.

While Tobin's Q and cash flow typically influence investment levels on a more gradual scale, incorporating ROE changes over the preceding 12 months allows for the capture of more immediate investment fluctuations. Hou (2014) observes that firms experiencing an uptick in profitability are likely to increase their investment levels in the near term. Our study, therefore, integrates these variables—Tobin's Q, free cash flow, and ROE—to construct a comprehensive and predictive model of expected investment variations.

The estimated regression of the expected investments will be:

E.I/A (lag for 1,3 year)= $\alpha+\beta 1$Tobin's Q + $\beta 2$FCFF+ $\beta 3$d.ROE (3.1)

Table 3-2: Monthly cross-sectional regression of expected investment

Variables	E(I/A) lag1	E(I/A) lag3
Tobin's Q	-0.004	0.002
	(0.00)	(0.46)
FCFF	0.0065	0.002
	(0.00)	(0.026)
ROE	0.0059	0.001
	(0.00)	(0.06)
R-square	0.03	0.0212
F-Test	33.14	2.54

For each month, cross-sectional regression of expected investment factor (capital expenditure-to-total asset), denoted as E(D.I/A),has been performed on the logarithm of Tobin's q, free cash flow to firm (FCFF), and the change in return on equity (D.ROE). Most of the variable has been winsorized at 5-95% level. Following Hou (2018), the average slopes in calculating E(D.I/A) are estimated from prior 120-month (30 month minimum) rolling window.

Table 3-2 presents the impact of Tobin's Q, Free Cash Flow to the Firm (FCFF), and Return on Equity (ROE) on the expected investment-to-asset ratio. All variables, except Tobin's Q, have undergone winsorized at the 5th to 95th percentile level to mitigate the influence of extreme values. Tobin's Q, on the other hand, has been winsorized at the 10th to 90th percentile range. This adjustment is crucial due to the presence of substantial outliers in our dataset, which could potentially skew the accuracy of the regression results. The slope coefficients used to predict the expected change in the investment-to-asset ratio (E(D.I/A)) are derived from rolling window regressions. In these regressions, the investment-to-asset ratio (D.I/A) is based on data

from the most recent fiscal year. This approach ensures that the analysis captures the most current investment behaviors and trends, providing a more accurate and relevant understanding of the influence of these financial indicators on investment decisions.

Beginning with the analysis of short-term expected investment levels (lagged by one year), our findings reveal a notable contrast between the impacts of ROE, cash flow, and Tobin's Q. Unlike ROE and cash flow, Tobin's Q exerts a negative influence on investment levels, a result that deviates from the findings of Aivazian (2000). The statistical significance of this relationship, indicated by a p-value of 0.00, suggests that the observed negative correlation between Tobin's Q and short-term expected investment levels is not a product of random chance. This phenomenon can be explained from multiple perspectives. initially, Firms with high Tobin's Q might be perceived as overvalued in the market. This perception could lead these firms to adopt a more cautious or risk-averse stance, opting to hold back on new short-term investments to mitigate potential risks that could negatively impact their market valuation. Further, a high Tobin's Q might more accurately reflect market expectations of future profitability rather than immediate investment opportunities. In such instances, firms could postpone investments, particularly if they believe that the market expectations are excessively optimistic or if they foresee an impending market adjustment. Additionally, when a firm exhibits a high Tobin's Q ratio, it may be an indicator of efficient capital allocation. Consequently, these firms may perceive additional short-term investments as unwarranted or less rewarding, considering that the expected returns may not sufficiently compensate for the associated costs. This scenario could contribute to a negative association between Tobin's Q and short-term investment activities.

In alignment with prior research, our empirical findings reveal that Free Cash Flow to the Firm (FCFF) positively influences short-term expected investment levels, as evidenced by a coefficient of 0.006 and a p-value of 0.00. This relationship can be elucidated through various principles. Consistent with the pecking order theory, firms demonstrate a preference for utilizing internal funds, such as FCFF, for financing new investments. This preference stems from a desire to circumvent the costs and

complexities associated with securing external financing. By relying on internal cash reserves, firms can more efficiently and economically allocate resources to investment opportunities. Also, From the perspective of signaling theory, robust FCFF metrics communicate to the market and potential investors about the firm's solid financial standing and the presence of profitable investment opportunities. Such a positive financial indicator can enhance the firm's market valuation, thereby simplifying the process of raising additional capital when necessary. Additionally, A substantial FCFF indicates that a firm possesses ample cash reserves post accounting for capital expenditures and operational working capital needs. This surplus in available cash significantly bolsters a firm's capability to invest in new endeavors or broaden the scope of existing projects. The relevance of this increased financial capacity is particularly pronounced in short-term investment scenarios, where quick access to funds is crucial.

Given the statistical significance of these results (p-value of 0.00), the positive relationship between ROE and short-term expected investment levels is highly reliable, which is similar with previous findings. Firstly, Roe is a key measure of a firm's profitability and efficiency in using its equity. A higher ROE indicates that the firm is generating more profits from its equity base. This increased profitability often provides more internal funds that can be reinvested into new or existing projects, thereby positively affecting short-term investment decisions. Secondly, Firms with high Roe are often in a better position to reinvest their earnings back into the business, leading to more investment opportunities. This reinvestment can be particularly significant in the short term as these firms seek to capitalize on immediate growth opportunities.

Regarding the impact on long-term expected investment levels, our empirical findings align with those of Hou (2018), showing that Tobin's Q does not significantly influence long-term expected investment levels. This is evidenced by a coefficient of 0.002 and a p-value of 0.46, suggesting that Tobin's Q might not be a robust predictor of a firm's investment behavior over an extended period. There are several factors that can explain this outcome. Firstly, the distinction between short-term and long-term strategic objectives in companies is crucial. Tobin's Q, more reflective of immediate market

perceptions, is likely more relevant to short-term strategies than to the long-term planning and investment processes. This suggests that while Tobin's Q may capture current market sentiments, it doesn't necessarily align with the strategic considerations that guide long-term investment decisions. Secondly, the factors influencing long-term investment decisions extend beyond mere market valuation, the primary domain of Tobin's Q. Long-term investments are typically shaped by a variety of elements, including strategic planning, projections of long-term market trends, technological advancements, and regulatory shifts. Such factors are often not immediately captured by market valuation metrics like Tobin's Q, thereby diluting its predictive power in the context of long-term investments. Lastly, the realization of investment benefits or outcomes generally occurs over a prolonged period. Consequently, a firm's current market valuation, as indicated by Tobin's Q, may not be a reliable forecaster of these delayed returns. The extended time frame allows for numerous other variables to come into play, weakening the direct correlation between current market valuation and long-term investment outcomes. This aspect highlights the complexity and multi-dimensional nature of long-term investment planning in firms.

The positive correlation between Free Cash Flow to the Firm (FCFF) and long-term expected investment levels, as evidenced by a p-value of 0.026, significantly emphasizes the role of internal cash flow in shaping a firm's long-term investment strategies. This statistical significance highlights FCFF as an indispensable resource, enabling firms to embark on extensive, long-term investment endeavors essential for their growth and evolution. Normally, higher FCFF typically signals reduced financial constraints, a crucial factor for long-term investments characterized by the need for stable and uninterrupted funding over prolonged periods. This aspect is particularly vital in facilitating large-scale projects and strategic initiatives that may not yield immediate returns but are fundamental for ensuring sustained growth and maintaining a competitive edge in the market. Additionally, firms endowed with robust FCFF enjoy enhanced flexibility in their strategic planning and decision-making. This financial leeway allows them to judiciously channel resources into long-term ventures, which, while potentially slow to realize profits, are integral to the firm’s long-term success and market positioning. The availability of substantial internal funds, therefore, not

only underpins the financial health of a firm but also serves as a key driver in its strategic investment decisions, underlining the pivotal role of FCFF in corporate financial management and strategic development.

The p-value of 0.06 in the empirical results, while not as indicative of strong statistical significance as a lower value might be, nonetheless points towards a meaningful, albeit moderate, relationship between Return on Equity (ROE) and long-term investment levels. This outcome emphasizes the influential role of profitability, as gauged by ROE, in shaping a firm's strategies and decisions regarding long-term investments. This result suggests that a positive ROE is frequently interpreted as a harbinger of a firm's future performance potential. Such a perception can motivate investments in long-term projects that are in harmony with the firm's projected growth trajectory. A strong ROE, therefore, not only reflects current profitability but also signals potential for continued success, guiding strategic investment decisions that have far-reaching implications. Moreover, firms exhibiting higher ROE typically benefit from increased availability of internal funding. This reduces their reliance on external sources of capital for financing long-term initiatives. This aspect is particularly beneficial for projects that necessitate substantial and sustained funding over extended periods. The capacity to internally finance these ventures provides firms with a strategic advantage, enabling them to pursue ambitious long-term projects without the constraints or uncertainties associated with external financing.

Our analysis scrutinizes the relationship between three key financial indicators – Tobin's Q, Free Cash Flow to the Firm (FCFF), and Return on Equity (ROE) – and expected investment levels, both in the short-term and long-term contexts. Notably, the impact of these indicators on short-term expected investment is more pronounced, with all of them showing a 1% significant level. In contrast, their influence on long-term investment is less marked; FCFF is significant at the 5% level and ROE at 10%, while Tobin’s Q does not demonstrate significant impact. This disparity can be attributed to several factors. Firstly, long-term investments inherently entail higher levels of uncertainty and risk. The decision-making process for such investments extends beyond immediate financial metrics, incorporating broader factors like market

trends, technological progress, and macroeconomic shifts. Consequently, the influence of financial indicators like Tobin's Q, FCFF, and ROE may be more muted in the long-term scenario. Secondly, Tobin's Q, as a reflection of market valuation, is particularly sensitive to current market conditions and investor sentiment. In the short-term, firms may more actively respond to these market signals, thereby swiftly adjusting their investment strategies in line with evolving market dynamics. Thirdly, in the short-term domain, indicators such as FCFF and ROE offer a more direct reflection of a firm's current financial health and the resources it has readily available. Firms tend to leverage these immediate resources for short-term investment opportunities. The tangible and immediate impact of these financial metrics renders their influence on short-term investment decisions more distinct and noticeable. In a word, while short-term investment decisions are more heavily influenced by current financial health indicators, long-term investments are shaped by a more complex set of factors, diluting the direct impact of these financial indicators.

3.5 Empirical Findings of Debt Structures

Myers (1977) famously argued that an increased likelihood of debt overhang might lead firms to forgo investment in projects with positive Net Present Value (NPV). Building on this, Lang (1996), Aivazian (2005), and Cai (2011) investigated the influence of long-term debt overhang on future investment levels, consistently finding that long-term debt can adversely impact future investments. Additionally, He (2011) and Vu (2014) explored the role of short-term debt, concluding that it too negatively affects near-future investments due to the intensification of default risks. Our study aims to delve into this negative relationship but from a reverse perspective, examining the impact from the opposite direction. Moreover, our analysis extends beyond expected investment. We also incorporate the Market-to-Book (MB) ratio, operating profitability, and firm size (measured by sales turnover) as control variables in our regression model of the debt variable. This selection aligns with the pecking order theory, which posits that firms characterized by high growth opportunities, strong profitability, and smaller size are more inclined to limit their debt issuance. By

including these variables, our study aims to provide a more comprehensive understanding of the factors influencing corporate debt decisions, thereby enriching the discourse on corporate finance and investment behavior. Therefore, our prediction of debt structure can be formalized as:

$$Debt(T,S,L)= \alpha+\beta 1 Expected\ investment+ \beta 2 MB+ \beta 3 profitablity+ \beta size +\varepsilon \quad (3.2)$$

Table 3-3, leveraging cross-sectional regression, reveals that the expected investment factor significantly and positively influences short-term debt issuance. This finding diverges from the argument put forth by Diamond and He (2014) but aligns with Myers' (1977) perspective. However, in the case of long-term debt, the expected investment factor does not exhibit a significant impact. The robust statistical significance of these outcomes (p-values of 0.00) warrants a multifaceted explanation. Firstly, in line with Myers' (1977) assertion, firms anticipating increased investment levels may show a preference for short-term debt, attributed primarily to its relative ease of access and quicker processing times. This characteristic makes short-term debt a more apt choice for meeting immediate or near-term investment needs, particularly when time sensitivity and urgency are key factors. Furthermore, firms often strategically align the maturity profiles of their debt with their investment horizons. This approach is evident in the practice of financing short-term investments with short-term debts, which aids in effective cash flow management and mitigates the liquidity risks that long-term financial commitments might pose. Moreover, the lack of a significant relationship between expected investment and long-term debt issuance implies that the forthcoming investments may not necessitate substantial capital expenditure or extended financial commitment typically associated with long-term financing.

An interesting observation from our dataset is the significantly higher ratio of short-term to long-term debt among the firms studied. This disparity could partly explain the positive correlation observed between total debt issuance and the expected investment factor. Overall, these insights provide a deep understanding of how firms tailor their debt strategies in response to anticipated investment requirements, considering factors such as the immediacy of funding needs, risk management, and the scale of investment.

The finding that the growth of firms positively correlates with all types of debt issuance presents a deviation from the expectations set by the pecking order theory. Firstly, high-growth firms often face significant capital demands to support their expansion activities. Although the pecking order theory suggests a preference for internal financing, these firms may still turn to external debt sources to meet their extensive capital requirements, particularly in scenarios where internal funds prove insufficient. This reliance on external debt reflects the practical necessities of sustaining and accelerating growth. Secondly, high-growth firms may actively seek to diversify their financing sources as a risk mitigation strategy. By not relying exclusively on equity or internal funds—which may be limited in availability or potentially more costly—they can achieve a more balanced capital structure through debt financing. This approach is especially pertinent in environments where equity financing could lead to dilution of ownership or where internal resources are not adequate to fund rapid expansion.
Furthermore, while the pecking order theory provides valuable insights into corporate financing behavior, it is not a one-size-fits-all solution and may not fully account for the complexities and unique circumstances of all firms. Particularly for high-growth firms, often in capital-intensive sectors or those pursuing aggressive expansion strategies, issuing debt can be a practical and necessary financial maneuver, even when it appears to contradict the traditional guidance of the pecking order theory. This adaptive approach to financing underscores the dynamic nature of corporate financial management, where theoretical models provide a framework, but practical considerations and market dynamics often dictate the actual financial decisions.

The results indicating that size positively impacts short-term debt issuance but negatively affects long-term debt issuance among large firms are quite compelling, especially considering their strong statistical significance (p-values of 0.00). Several key factors can explain these findings. Firstly, larger firms typically exhibit enhanced liquidity and are perceived as more creditworthy. This reputation facilitates their access to short-term debt markets. Lenders often display a higher propensity to extend short-term loans to these firms, motivated by their lower perceived risk and a stronger

capability for repayment. This ease of access to short-term credit aligns with the operational requirements and financial agility that large firms often seek. Secondly, large firms are generally endowed with more substantial internal resources and cash reserves. This abundance of internal financing capacity diminishes their dependence on long-term debt. Such firms, having accumulated profits and reserves over time, are well-equipped to utilize these funds for financing their long-term projects and investments. This internal funding ability allows them to strategically choose their debt instruments. Thirdly, there is a conscious effort by large firms to manage long-term financial risk effectively. By limiting their exposure to long-term debt, these firms avoid entrenching themselves in extensive financial obligations that could potentially constrain their future strategic and financial flexibility. This cautious approach to long-term debt reflects a strategic decision to maintain financial freedom and adaptability in the face of evolving market conditions and corporate objectives. Overall, these results highlight a preference for leveraging short-term debt to capitalize on their creditworthiness and liquidity, while simultaneously exercising prudence in their long-term debt commitments to preserve financial flexibility and minimize risk.

The results indicating that profitability has a significant and negative impact on all types of debt issuance align well with the principles of the pecking order theory. This theory posits that firms typically prefer to finance their activities using internal resources before turning to external debt. High profitability, therefore, suggests that firms can more readily meet their investment and operational needs through their earnings, reducing their reliance on both short and long-term debt. Moreover, profitable firms are often characterized by a conservative approach to risk management. They tend to avoid the additional risks associated with debt, such as financial distress and the burden of increased obligations. This caution stems from a desire to maintain financial flexibility and stability, crucial elements for sustained business growth and resilience. Furthermore, from the standpoint of signaling theory, profitable firms may deliberately opt for lower levels of debt to project an image of financial strength and stability to investors and the broader market. A lower debt level is frequently perceived as an indicator of solid financial health and prudent management. Such a stance can be particularly beneficial for a firm's reputation and valuation, as it reflects a

strategically sound and risk-averse financial approach.

In summary, our findings diverge from those of He (2014), who posited that the level of expected investment could negatively affect debt issuance. Contrary to this assertion, our analysis reveals a different trend. Additionally, the applicability of the pecking order theory in our study appears to be limited. This is evidenced by the results derived from examining the size and growth indicators, both of which yield conclusions that deviate from the predictions of this theory. Specifically, our findings suggest that larger and faster-growing firms are associated with increased debt issuance, a trend that runs counter to the traditional expectations of the pecking order theory. However, it is noteworthy that the results pertaining to profitability align with the pecking order theory. Consistent with the theory's predictions, our analysis indicates that higher profitability correlates with reduced debt issuance. This aspect of our findings emphasis the theory's premise that firms with ample internal resources, such as profitable firms, tend to rely less on external debt financing.

Table 3-3: Debt issuance regression

Variables	Short-term debt	Long-term debt	T.debt
E(IA)	0.0028	0.00052	0.021
	(0.00)	(0.479)	(0.00)
MB	0.008	0.002	0.003
	(0.00)	(0.00)	(0.00)
size	0.0003461	-0.003	-0.03
	(0.00)	(0.00)	(0.00)
Profit	-0.06	-0.03	-0.09
	(0.00)	(0.00)	(0.00)
R-square	0.63%	0.42%	1.2%

F-test	58.4	44.8	88.4

The table provides the cross-sectional regression results of leverage on expected investment level on North American listed firms during 1980-2021by using four dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates. P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables include the total debt, short-term borrowing ,and long-term borrowing. All the variables are scaled by the total assets.

3.5.2 Economic cycle and Debt Issuance

Table 3-4. expected investment level

Variables	Expansion	Recession
Tobin's q	0.005	0.011
	(0.00)	(0.00)
FCFF	-.128	-0.17
	(0.00)	(0.00)
Roe	0.027	0.005
	(0.00)	(0.719)
R-square	3.83%	6.4%
Prob > chi2	0.12	0.213

The table provides the panel random effects results of leverage on expected investment level on North American listed firms during recession cycle by using three dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates.

P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables is the investment ratio lagged for 1 year. All the variables are scaled by the total assets. for expansion cycle, there are 3062 firms in sample; however, only 1809 firms in recession sample.

Based on the research findings, it is evident that both Tobin's q and Free Cash Flow to the Firm (FCFF) are reliable predictors of expected investment in both expansion and recession periods. Notably, FCFF demonstrates a significantly negative impact on expected investment. Conversely, Return on Equity (ROE) exhibits a substantial influence on expected investment only during expansion periods.

These observations can be elucidated through various reasons. As per the agency theory articulated by Jensen (1976), firms with abundant cash flows (high FCFF) may engage in inefficient investment practices. During recessions, the tendency is for firms to adopt a cautious stance, scaling back investments despite having available cash, in an effort to conserve liquidity. This conservative approach is also observable in expansion periods, where firms might prioritize financial stability, or where managerial decisions are influenced by a preference to retain cash for personal gain or due to risk aversion. Additionally, firms with high FCFF might also contend with significant debt obligations (debt overhang). In such instances, available cash flows are often allocated towards debt servicing rather than funding new investments, a trend that can persist across both economic phases.

During expansionary times, characterized by a favorable economic condition, firms with higher ROE are more inclined to invest in new ventures, expansions, or innovations. This positive correlation between ROE and investment is fueled by the general optimism and affirmative market sentiments prevalent during these periods. Firms with a solid profitability track record, as denoted by high ROE, are likely to exhibit greater confidence in their investment capabilities, expecting lucrative returns from new projects. However, the scenario shifts during recessions. Economic uncertainties and a heightened sense of risk aversion become dominant. Firms, even those with high ROE, may exercise caution regarding investments, driven by the

unpredictable economic outlook. This leads to a diminished or absent correlation between ROE and investment. In these times, companies might prioritize reallocating resources to more immediate concerns such as debt repayment, enhancing operational efficiencies, or the upkeep of existing assets, over pursuing expansion opportunities.

Table 3-5.Debt issuance at Expansion periods

Variables	Short-term debt	Long-term debt	Total debt
EI	0.0496	0.0103	0.018
	(0.00)	(0.00)	(0.00)
profit	-0.108	-0.035	-0.165
	(0.00)	(0.00)	(0.00)
MB	-0.002	-0.0029	-0.006
	(0.00)	(0.00)	(0.00)
Size	0.039	-0.0061	-0.036
	(0.00)	(0.00)	(0.017)
R-square	6.8%	7.1%	1.45%
Prob > chi2	0.13	0.26	0.09

The table provides the panel random effects results of leverage on expected investment level on North American listed firms during expansion cycle by using three dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates. P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables include the total debt, short-term borrowing, long-term borrowing,. Independent variable is Expected investment factor (EI), MB-ratio, Profitability (EBIT), and Size (sales turnover). All the variables are scaled by the total assets.

Table3-6. Debt issuance at Recession periods

Variables	Short-term debt	Long-term debt	Total debt
EI	-0.02	-0.021	-0.05
	(0.00)	(0.00)	(0.00)
profit	-0.05	0.036	-0.16
	(0.00)	(0.00)	(0.317)
MB	0.011	0.0104	0.02
	(0.00)	(0.00)	(0.00)
Size	-0.002	-0.003	-0.0055
	(0.14)	(0.00)	(0.01)
R-square	2.61%	1.9%	6.37%
Prob > chi2	0.17	0.11	0.13

The table provides the panel random effects results of leverage on expected investment level on North American listed firms during recession cycle by using three dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates. P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables include the total debt, short-term borrowing, long-term borrowing. Independent variable is Expected investment factor (EI), MB-ratio, Profitability (EBIT), and Size (sales turnover). All the variables are scaled by the total assets.

Tables 3-5 and 3-6 present the results regarding the influence of economic cycles on debt issuance decisions. The findings illustrate a stark contrast in the impact of the expected investment factor on debt issuance between expansion and recession periods. In line with Myers' (1977) theory, during expansion periods, all types of debt issuance

exhibit a positive correlation with the expected investment factor, with a significance level of 1%. Conversely, in recession periods, all types of debt issuance are negatively influenced by the expected investment factor, also at a 1% significance level, corroborating the perspective put forth by He (2014). This divergence can be attributed to the following reasons.

Firstly, the expansion periods are characterized by an abundance of investment opportunities for firms. The positive relationship observed suggests that firms are likely to finance these opportunities by increasing debt issuance, be it long-term or short-term. On the other hand, during recessions, a heightened sense of risk aversion permeates both firms and markets. Companies may foresee challenges in repaying new debt due to the uncertainty of future revenues, leading them to restrain from augmenting their leverage.

Secondly, from an interest rate standpoint, expansion periods typically align with more favorable credit conditions and lower interest rates, rendering debt a more appealing option for financing anticipated investments. In contrast, recessionary periods often witness lenders tightening credit conditions, with an accompanying widening of corporate credit spreads and escalating interest rates, ultimately making it more challenging for firms to procure new debt.

Thirdly, an expanding economy fosters a general atmosphere of optimism among both firms and investors. This positive sentiment facilitates easier access to debt financing, as investors display a greater willingness to lend, and firms are more inclined to assume debt in anticipation of future growth. However, during recession periods, firms might engage in active deleveraging efforts to fortify their balance sheets, explaining the negative correlation observed with new debt issuance.

The findings related to the impact of the market-to-book (MB) ratio on debt issuance demonstrate significant variations between economic cycles. During expansion periods, in line with the trade-off theory, the MB ratio exhibits a negative impact on

debt issuance. Conversely, during recession periods, there's a positive influence on debt issuance, aligning with the pecking order theory. These results are in agreement with the observations made by Frank and Goyal (2009), and can be attributed to the following factors.

Firstly, a higher MB ratio generally signifies a favorable market valuation of a firm relative to its book value. In times of economic expansion, firms with high MB ratios may lean towards equity financing rather than debt. This preference stems from their robust market valuation, which renders equity issuance more advantageous and cost-effective compared to debt financing. On the other hand, during periods of economic uncertainty, firms might opt for debt financing to maintain financial flexibility. The positive correlation observed suggests that firms, even those with higher MB ratios indicative of growth potential, may feel compelled to increase leverage as a prudent measure in a volatile market. Secondly, the prevailing market sentiment significantly influences these decisions. Expansion periods typically evoke optimism in the market, resulting in elevated stock prices and MB ratios. Firms could capitalize on this optimism by favoring equity issuance over debt. However, during recessionary times, the market sentiment generally skews towards pessimism, dampening the receptiveness of equity markets. Consequently, firms, even those with relatively high MB ratios, may find themselves more reliant on debt issuance, as the avenues for equity financing become constrained or disproportionately costly.

3.6 Robustness check

To ascertain the robustness of our models, we undertook a thorough series of tests, encompassing residual analysis, goodness of fit, and deviation reduction. The residual analysis revealed that they predominantly align with a normal distribution, with special emphasis on identifying potential outliers, defined as values exceeding ±3 standard deviations from the mean. This investigation, however, did not uncover any significant outliers.

Additionally, we conducted a heteroskedasticity test to scrutinize the stationarity of

the residuals. The outcomes of this test showed no significant heteroskedasticity issues (none of the Breusch-Pagan test result below 0.05), thereby enhancing the trustworthiness of our model.

Beyond these evaluations, we implemented both an F-test to further validate our results. The F-test was instrumental in determining the overall significance of our regression model. The results from test are affirmative, lending substantial support to the overall significance and robustness of our regression model.

Moreover, we incorporated a fixed effects analysis within our economic cycle examination. The outcomes from this analysis were in alignment with those obtained from the random effects model. Additionally, for the entire sample, we utilized Return on Capital Employed (RoCE) and Free Cash Flow to Equity (FCFE) as substitute proxies to construct the expected investment factor. The consistency of these results with our primary findings further corroborates the validity of our research.

In summary, these multifaceted tests form a comprehensive framework for evaluating the robustness of our models, ensuring that our findings are reliable and valid within the context of our research.

3.7 Implications and Limitations

3.5.2 implications

Reinterpretation of Debt Overhang in Dynamic Economic Contexts

Our findings challenge the conventional understanding of debt overhang, particularly in the dynamic interplay between economic cycles and debt structures. The positive correlation of expected future investment with debt issuance during expansion periods and the inverse relationship during recessions necessitate a nuanced understanding of debt overhang. Firms appear to adapt their leverage strategies based on economic

conditions, suggesting a more fluid and responsive approach to managing debt than previously assumed.

Bridging Theoretical Perspectives

The results reconcile aspects of trade-off and pecking order theories. During expansions, the preference for debt aligns with the trade-off theory's emphasis on leveraging growth opportunities. In contrast, the pecking order theory's assertion of a cautious approach to debt in uncertain times is evident during recessions. This duality underscores the need for theoretical models that account for economic variability in their assumptions.

Implications for Corporate Financial Strategy

For practitioners, these findings underscore the importance of aligning debt issuance strategies with broader economic trends. The data suggest that leveraging debt during expansions can be a growth-enhancing strategy, while conservative debt management during downturns can mitigate risks associated with financial distress. This approach requires firms to be adept at economic forecasting and agile in adjusting their financial strategies accordingly.

Broader Economic Insights

The research highlights how corporate debt behavior can serve as an indicator of broader economic trends. The observed patterns in debt issuance relative to economic cycles can provide insights into the prevailing business confidence, investor sentiment, and overall financial health of the corporate sector.

3.7.2 Limitations

The limitations of this paper are centered around its focus on U.S. listed companies, which may not fully represent trends in other markets or unlisted firms. The reliance

on historical data may not adequately reflect the current, rapidly changing economic landscape, and the assumption of a linear relationship between variables could oversimplify complex financial dynamics. The paper also omits qualitative factors like managerial decision-making and corporate culture, which can significantly influence debt strategies. Additionally, the methodologies used, including cross-sectional and random effect analyses, do not account for time-weighted factors, possibly affecting the accuracy in capturing data trends. Future research should address these limitations with more sophisticated methodologies to deepen the understanding of debt management across diverse economic contexts.

3.7.3 Future Research

Sector-Specific Analysis

Future studies should delve into sector-specific responses to economic cycles in debt management strategies. Different industries may exhibit unique patterns in leveraging and de-leveraging, offering deeper insights.

Global Perspective

Expanding the research scope to include international markets would provide a more comprehensive understanding of debt strategies in diverse economic environments.

Corporate Governance Impact

Investigating the influence of corporate governance structures and decision-making processes on debt management across economic cycles would be enlightening.

Impact of Technological and Market Innovations

Assessing how technological advancements and emerging market trends influence corporate debt strategies would keep the research current and relevant.

3.8 Conclusion

The research uncovers a complex interplay between investment expectations and debt issuance, which varies significantly during periods of economic expansion and recession. This finding illuminates the adaptable nature of corporate finance decisions, presenting a challenge to conventional theories of debt management. Our analysis employs a cross-sectional approach to reveal that short-term debt is significantly influenced by anticipated future investments, aligning with Myers' (1977) argument. Conversely, long-term debt shows a positive correlation with expected investment levels, supporting Zhang's (2022) findings and the pecking order theory, which posits long-term debt as a preferred method for securing investment funds.

Furthermore, the debt issuance of firms with substantial growth prospects is less influenced by future investment levels compared to mature firms. This suggests a nuanced understanding of how company growth stages impact financial strategies. Additionally, we align with Lemon (2008) and Akhtar (2012) in recognizing that capital structure decisions are impacted by time-invariant factors. During economic expansion, both short-term and long-term debts are positively influenced by future investment levels. However, in recession periods, all debt levels are adversely affected by anticipated investments.

In constructing the expected investment factor, we identified Tobin's Q, Free Cash Flow to Firm (FCFF), and Return on Equity (ROE) as reliable predictors. Notably, in the short-term expected investment factor (lagged by one year), Tobin's Q exhibits a negative influence. Also, during recessions, the explanatory power of ROE diminishes, likely due to heightened economic uncertainties and increased risk aversion.

Addressing the limitations acknowledged earlier, future research could delve deeper into the heterogeneity across industries, time progression, and geographical regions. For instance, categorizing companies into different sub-samples based on the Standard Industrial Classification (SIC) code would allow for a comparative analysis of capital

structures across various industries. Additionally, incorporating time-sensitive weighting methods, such as the Exponentially Weighted Moving Average (EWMA) model, could emphasize the relevance of recent data. Alternatively, segmenting the analysis into distinct phases could offer insights into temporal shifts in financial strategies. Expanding the dataset to include more countries or regions would also contribute to a more exhaustive and globally representative study.

Chapter4.

Exploring the Relationship Between Debt Overhang , expected investment and Liquidity in Corporate Finance: Global Study

Abstract:

This paper investigates into the intricate relationship between debt overhang, expected investment, and liquidity, which are pivotal in shaping a firm's financial health and strategic choices. It investigates how a company's existing debt, known as debt overhang, can hinder its ability to launch new projects or secure additional funding, especially during financial strains. The evolution of this concept in financial literature has transitioned from general discussions on capital structure to a more focused examination of how excessive debt levels impede future investments and growth. A key aspect of this study is liquidity, defined as the facility of converting assets into cash and fulfilling short-term obligations.

Utilizing CompStat fundamental annual data from North-American (referred to as US-listed in this study) and Global listed firms spanning 1987 to 2022, the research proposes a novel approach. It suggests the construction of a q-factor based on liquidity indicators to evaluate the expected investment levels and their impact on short-term and long-term debt overhang. The findings for US-listed firms indicate that liquidity positively affects capital expenditure in both the short and long term. Conversely, for Global firms, liquidity shows a negative effect on short-term investment but a positive impact in the long term. Regarding expected investment, for US-listed firms, it negatively influences short-term debt but positively affects long-term debt, while no significant impact on debt overhang was observed for Global firms.

Key words: Debt Overhang, Expected Investment, Liquidity, Capital Structure

4.1 Introduction

Debt overhang, liquidity and investment level are pivotal in understanding a firm's financial health and strategic decision-making. Debt overhang is a critical concept in corporate finance, representing a situation where a company's existing debt burden inhibits its ability to take on new projects or raise additional capital. This phenomenon is particularly relevant in periods of financial distress or economic downturns, where it can significantly impact a firm's growth and operational strategy. The concept of debt overhang has evolved significantly in financial literature. Initially, it emerged from the broader discussions on capital structure and its impact on firm value. Over time, the focus has shifted to understanding how excessive debt levels can act as a deterrent to future investments and growth. Many works in this area, such as those by Myers (1997) and He (2014), have been pivotal in shaping this understanding.

Debt overhang occurs when the current loans of a firm is so large that any additional funding or profits are likely to be used to service this debt, rather than to invest in new profitable projects. This situation creates a distress for both the company to undertake new projects and for potential investors to inject new capital, as the benefits of these investments are likely to accrue more to existing debt holders rather than equity holders or new investors. The effects of debt overhang are not limited to large firms. Small businesses can also be significantly impacted by high levels of debt, which can stifle their ability to innovate and expand. Understanding these effects across different types of organizations is crucial for a comprehensive grasp of the concept.

Investment decisions are among the most critical choices that firms face, directly impacting their growth, profitability, and long-term success. These decisions, including whether to invest, how much, and in what, are influenced by a myriad of factors ranging from the firm's financial health to broader economic conditions. The Modigliani-Miller theorem provides a foundational perspective on the impact of financing on firm value. However, in reality, factors such as taxes, bankruptcy costs, and market imperfections significantly affect investment decisions, deviating from the

theorem’s idealized scenarios. later, the concept of the Net Present Value (NPV) is central in investment decision-making. This metric helps firms assess the profitability of an investment by calculating the present value of future cash flows. The NPV rule suggests that investments should be made if they yield positive NPV, indicating that they are expected to generate value over their cost. Furthermore, A firm's financial health and capital structure play a vital role in its investment decisions. Financial health, indicated by factors like liquidity, cash flow, and profitability, determines a firm’s ability to fund investments. The capital structure, the mix of debt and equity financing, influences the cost of capital, which in turn affects investment choices. High levels of debt can lead to debt overhang, where firms may forego profitable investments due to the burden of existing debt obligations.

The primary impact of debt overhang on a firm’s investment decisions is the underinvestment problem. Firms with large debts are often reluctant to undertake new projects, even if these projects have positive net present values (NPVs). The reason is simple: the gains from such investments would primarily be used to service existing debt, offering little to no benefit to equity holders who bear the investment risk. This scenario leads to missed opportunities and can stifle innovation and growth. Empirical evidence supports this theoretical framework. Lang (1996) have shown that highly leveraged firms tend to invest less in growth opportunities compared to their less-leveraged peers. This trend is particularly pronounced in industries that are capital-intensive or in economic environments where access to capital is restricted. Economic conditions also play a important role in exacerbating or mitigating the effects of debt overhang on investment decisions. During economic downturns, the risks associated with debt overhang are magnified. Firms may find it more challenging to service their debt due to reduced revenues, leading to even more significant constraints on investment. Conversely, in booming economies, the increased cash flow can ease the debt burden, potentially alleviating some of the underinvestment issues caused by debt overhang. Overall, Debt overhang presents a significant challenge to corporate investment decisions. Its impact is multifaceted, affecting not only the firm’s ability to undertake new projects but also influencing its long-term strategic direction and competitive standing.

Liquidity is also a fundamental concept in finance and economics, containing both the ease with which assets can be converted to cash and the ability of a company to meet its short-term obligations. This dual aspect of liquidity makes it a cornerstone of both individual asset management and corporate financial strategy. At its core, liquidity refers to the efficiency and speed with which an asset can be converted into a medium of exchange, such as cash, without affecting its market price. Highly liquid assets, like cash itself or treasury bills, can be quickly and easily converted, whereas less liquid assets, such as real estate or specialized equipment, may take longer to sell and potentially at a discount. The importance of liquidity can be traced back to Keynes's theory, in his opinion, emphasized the preference for liquidity, particularly in times of economic uncertainty, reflecting a desire for cash or near-cash assets that can be quickly mobilized in response to unforeseen needs or opportunities.

In terms of corporate finance, liquidity is an essential indicator for operational and strategic flexibility. Liquidity enables firms to meet short-term debts, such as account payable, and is a buffer against financial distress. As Modigliani and Miller's theory of capital structure stated, while debt can be a cheaper source of finance due to tax shields, higher debt levels increase financial risk, thus necessitating higher liquidity to mitigate these risks. The importance of liquidity has been underscored by the 2009 Financial Crisis in both financial markets and the broader economy. After 2008, Liquidity requirements were officially introduced in the Basel III accord, a set of international banking regulations developed by the Basel Committee on Banking Supervision. Basel III was developed in response to the deficiencies in financial regulation revealed by the financial crisis of 2007-2008. One of the key aspects of Basel III is the introduction of liquidity standards, which were not a part of the earlier Basel I and Basel II frameworks.

Based on investment perspective, liquidity is a key factor in asset selection and portfolio construction. Investors often demand a liquidity premium for investing in less liquid assets, as noted in the work of Amihud (2006) . Liquidity also plays significant role in both of micro and macro-economic context. In micro financial

markets, liquidity is extended to the ease with which traders can transact in a market without causing significant price movement. Market liquidity is a function of the depth (volume of orders), breadth (range of different orders), and resiliency (speed at which prices return to equilibrium after a trade) of the market. From macroeconomic perspective, central banks, through tools such as open market operations and discount rates, influence the liquidity in the banking system, thereby impacting interest rates and credit availability. This, in turn, affects economic activity.

Additionally, the relationship between liquidity and debt overhang is also quite intricate. Understanding how these two factors interact is crucial for assessing a firm's financial health and its strategic decision-making. Firstly, A firm with high liquidity (i.e., substantial cash) is better positioned to manage and service its debt, potentially reducing the severity of a debt overhang situation. This can make the firm more attractive to potential investors and lenders. High liquidity also provides a firm with more options to strategically manage its debt, such as refinancing at more favorable terms or paying down debt to reduce the overhang.

Secondly, A firm experiencing serious debt overhang problem might find it difficult to raise additional funds through equity or debt, thereby limiting its ability to boost liquidity. This can create a vicious cycle where the lack of liquidity exacerbates the debt overhang problem. The need to allocate a significant portion of cash flows to service existing debt can limit a firm's operational liquidity, affecting its ability to fund ordinary operations and invest in growth opportunities. Conversely, firms with high liquidity may still be able to pursue investment opportunities even under debt overhang, as they have the sufficient funds to invest. However, the decision to invest must be balanced against the need to address the debt burden. Firms with high liquidity may also have more leverage in negotiations with creditors for debt restructuring, since it poses a lower credit risk. Thirdly, Investors and creditors often view liquidity as a buffer against the risks associated with high debt levels; therefore, A firm with good liquidity in the face of debt overhang can maintain or even boost investor confidence. Also, adequate liquidity in a firm experiencing debt overhang can signal to the market that the company can manage its financial obligations and has the potential for

recovery or growth.

This paper contributes on exploring the relationship between debt overhang and liquidity. In detail, the study firstly aims to construct a q-factor about expected investment level based on the liquidity indicator of firm. Then, check the influence of the expected investment factor to long-term and short-term debt overhang. The dissertation is structured to methodically explore the subject. Following this introduction, the next chapter delves into literature review, followed by a chapter on methodology. Subsequent chapters present data analysis, findings, discussions, and robustness check, culminating in a conclusion that synthesizes the research and suggests areas for future study.

4.2 Literature Review

4.2.1 Debt overhang

Diamond and He (2014) makes a significant contribution to the understanding of debt maturity structures in corporate finance. Addressing the critical issue of debt overhang, they illustrate how the maturity of a firm's debt influences its investment decisions and potential for growth.

debt overhang is core concept of this paper, a situation where firms burdened by substantial existing debt may forego profitable investments, as the primary benefits would accrue to debt holders rather than equity holders. Diamond's analysis extends beyond the typical discussion of debt overhang by focusing on how varying debt maturities can mitigate or exacerbate this problem.

A key argument posited by the authors is the strategic balancing between short-term and long-term debt. they suggest that short-term debt can be beneficial in managing debt overhang risks. Short-term debt allows for more frequent renegotiation, aligning the interests of debt and equity holders and reducing the likelihood of underinvestment. In contrast, long-term debt, while providing stable financing, may lead to a persistent debt overhang that stifles investment and growth. Furthermore, they examine the

relationship between the risk profile of a firm's investments and its debt maturity choice. The authors argues that firms with riskier investment projects might lean towards shorter debt maturities to avoid the underinvestment issues associated with long-term debt.

Lang, Ofek, and Stulz (1996) provide a comprehensive analysis of the intricate relationship between a firm's leverage, its investment decisions, and its growth trajectory. This paper is particularly significant for its empirical exploration of how leverage can impact a firm’s ability to grow through investment. Central to the study is the examination of the debt overhang theory. The authors propose that high levels of leverage might hinder a firm's growth, primarily due to the constraint on available resources for investment. This phenomenon occurs because existing debt obligations take precedence, and any potential benefits from new investments could primarily accrue to debt holders, thereby disincentivizing equity holders. The empirical analysis conducted by the authors involves a detailed examination of US listed firm data, through which they demonstrate a negative relationship between leverage and firm growth. This relationship is particularly pronounced in firms that have fewer investment opportunities, highlighting how debt can be especially constraining in environments where growth opportunities are not readily exploited.

An important contribution of this study is its differentiation of the impact based on firm characteristics. The authors show that the adverse effects of leverage on investment and growth are more significant in firms that are smaller and have less tangible assets. This insight is crucial as it suggests that the impact of leverage is not uniform across all firms. The findings of the authors have profound implications for corporate finance, particularly in understanding how capital structure decisions can shape a firm's growth prospects. Their work underscores the importance of strategic debt management in fostering an environment conducive to investment and long-term growth.

In their 2005 study, Aivazian, Ge, and Qiu undertake a detailed examination of the

influence of leverage on firm investment, providing empirical insights from the Canadian market. This study is significant for its focus on the dynamic relationship between debt levels and corporate investment decisions, a crucial aspect in the field of corporate finance.

The authors approach this relationship by scrutinizing the varying effects of leverage on firms of different sizes. They posit that the impact of leverage on investment behavior is not uniform across the board but depends on firm-specific characteristics such as size. The study's findings reveal that high leverage significantly reduces investment in large firms, supporting the debt overhang theory, which suggests that high levels of debt can lead to underinvestment due to the risk of the benefits accruing more to debt holders rather than equity holders. Conversely, for small firms, the study finds a positive relationship between leverage and investment. This counterintuitive result is explained through the signaling theory, where small firms use higher leverage to signal their quality and investment opportunities, thereby attracting investment. The study's implications extend beyond the Canadian context, providing valuable lessons for firms, investors, and policymakers globally. It underscores the importance of considering firm size and market context when assessing the impact of financial policies on corporate investments.

Moyen (2007) paper addresses the crucial issue of debt overhang in corporate finance, specifically focusing on quantifying its impact on firm investment. The paper begins with an explanation of the debt overhang concept – a scenario where a firm’s high debt level inhibits additional investment, as new projects' returns would primarily benefit debt holders over equity holders. The author employs a robust methodology that involves analyzing a comprehensive panel data of US listed firms to assess how debt levels correlate with investment decisions.

A critical contribution of Moyen's work is the differentiation of the debt overhang effect across various firm sizes and market conditions. Her findings suggest that the impact of debt overhang is not uniform but is influenced by firm-specific factors. This insight is particularly valuable as it highlights that the severity of debt overhang can

vary significantly, with some firms being more susceptible to its effects than others. Moreover, Moyen's study contributes to the understanding of how debt financing influences corporate investment strategy. By quantifying the debt overhang problem, the paper sheds light on the potential costs of high leverage and how it can act as a barrier to firm growth and innovation.

Cai and Zhang (2011) investigate the complex relationship between leverage change, debt overhang, and stock prices. The paper documents a significant and negative effect of changes in a firm's leverage ratio on its stock prices, notably stronger for firms with higher leverage, greater likelihood of default, and more severe financial constraints. The study contextualizes this relationship within the broader framework of capital structure decisions, acknowledging the importance of these decisions in affecting a firm’s financing capacity, risk, cost of capital, and ultimately, shareholder wealth. The authors employ an extensive dataset from Compustat and CRSP, covering U.S. stocks from 1975 to 2002, to empirically analyze the impact of leverage changes on stock prices. Consistent with Myers' (1977) debt overhang theory, Cai and Zhang observe that higher leverage increases the probability of a firm forgoing positive NPV projects, resulting in under-investment and reduced firm growth. Empirically, they find that a 10% increase in leverage ratio is associated with a significant reduction in future investment and capital expenditures. The study also examines the severity of leverage change effects, noting that firms more prone to debt overhang are more severely affected by increases in leverage ratio.

Ahn, Denis, and Denis (2006) delve into the intricate dynamics between leverage, investment, and the diversified nature of firms. The study highlights a significant, more pronounced negative impact of leverage on investment in high-quality (high q) and non-core segments within diversified firms, suggesting a skewed allocation of debt service burden in these areas. This study is pivotal in understanding the leverage-investment relationship in diversified firms, given their unique ability to allocate debt service across different business units, potentially without considering the value of each segment's investment opportunities. Using a substantial dataset encompassing 8,674 firms and years from 1982 to 1997, the authors observe that diversified firms

generally employ more leverage than focused firms. Interestingly, they find that while diversified firms invest more overall, this trend is confined to specific business units, particularly those that are core and low q. the results of this study imply that while leverage generally restricts managerial discretion over investment, the diversified structure offers a counterbalance by allowing discretion in allocating debt service.

Marchia and Mura (2010) examine the impact of debt overhang to the investments on UK listed companies. The study demonstrates that a conservative leverage policy, maintaining financial flexibility, can significantly enhance a firm's capacity to make larger capital expenditures and increase abnormal investments. This relationship is found to be both statistically significant and economically sizeable. The authors identify financially flexible (FF) firms by focusing on those with spare debt capacity (SDC). They estimate a leverage equation to calculate the predicted level of debt, noting the demand for financial flexibility as an unobservable factor. The study tests the impact of financial flexibility on investment ability, positing that in the presence of market frictions, FF firms, anticipating valuable future growth options, may pursue a policy of low leverage for an extended period. This strategy provides them with the borrowing power necessary to invest more significantly in subsequent years. Their findings indicate that an average company maintaining a spare debt capacity policy for three years can increase its capital expenditures by around 37%. However, the longer the period of low leverage, the lower the economic impact of FF status on investment ability. This suggests that the ability of managers to foresee future growth opportunities diminishes over time.

4.2.2 Liquidity and investment decisions

Chirinko and Schaller (1995) offers a compelling analysis of the significance of liquidity in investment equations, challenging the conventional understanding of finance constraints in corporate investment. The paper scrutinizes the role of liquidity, particularly in the context of firms with varied information positions, using a sample of 212 Canadian firms from 1973 to 1986. The core question the study addresses is why liquidity variables are significant determinants of investment spending. Two

primary explanations are considered: firms facing finance constraints and liquidity acting as a proxy for omitted variables. The authors utilize distinctive Canadian institutional features, such as concentrated share ownership and interrelated group memberships, to classify firms based on their information position. This unique dataset enables a nuanced exploration of the relationship between liquidity and investment across different types of firms

Analyzing internal funds and Q models, the authors find that liquidity matters more for firms in weaker information positions, suggesting that finance constraints, primarily arising from asymmetric information problems, are a significant factor influencing investment decisions. This result is further supported by empirical evidence showing that finance constraints seem to be important and predominantly stem from asymmetric information issues as proposed by recent theory. overall, this research provides important insights into the role of liquidity in investment decisions, highlighting the complexity of finance constraints and their varying impact based on firms' informational context. The findings have significant implications for understanding corporate investment behavior, especially in environments where information asymmetry is prevalent.

Owen Lamont (1997) examines the impact of financial shocks on the investment behavior of diversified firms, particularly focusing on the oil price decline of 1986 and its effect on non-oil investments by oil companies. Lamont explores the interdependence of financial costs within different segments of the same corporation, testing the hypothesis that a decrease in cash or collateral, while holding the profitability of investment constant, leads to reduced investment in other segments of the company. The study's methodology involves analyzing the capital expenditures of non-oil subsidiaries of oil companies using data from the COMPUSTAT database. The primary focus is on how these subsidiaries reacted to the oil price decline, which significantly reduced the cash flow and collateral value of oil firms. Lamont compares the investment behavior of these non-oil segments with similar segments in companies less dependent on oil, uncovering that oil companies significantly reduced their non-oil investment during this period

This research contributes to a broader understanding of liquidity, investment, and internal capital markets. The author delves into the established correlation between cash and investment in corporate finance and macroeconomics, highlighting the challenges in establishing a causal connection due to both being influenced by underlying profitability shocks. The study emphasis the significance of internal capital markets in modern industrial economies, where managers allocate capital across various projects. Lamont notes that internal capital markets, which differ from external ones due to their flexibility and fungibility, play a crucial role in financing the bulk of investment in non-financial corporations.

Claudio Raddatz (2006) provides an insightful exploration into how financial development impacts macroeconomic volatility, especially in the context of liquidity provision. Raddatz posits that financial development leads to a significant reduction in the volatility of output, particularly in sectors with high liquidity needs. The study finds that this reduction is largely attributed to the stabilization of output in existing firms, while also noting a substantial decline in the volatility of the number of firms. Raddatz's study responds to a debate in the literature about the role of financial development and institutions in mitigating the effects of external shocks and crises. While some studies suggest that a more developed financial system correlates with decreased output volatility, others argue that institutional factors play a more central role. This paper, however, provides new evidence supporting the causal effect of financial development on reducing output volatility, specifically by addressing liquidity needs in times of working capital problems.

The methodology employed in the study involves analyzing data from 70 manufacturing industries across 48 countries during 1981–1998, utilizing US listed firms' data to measure the liquidity needs of different industries. The regression analysis shows that financial development significantly reduces the relative output volatility in industries with higher liquidity needs, controlling for country and industry fixed effects and other determinants of volatility. Also, the results suggest that suggesting that improvements in financial development could lead to substantial

reductions in overall economic volatility.

Dasgupta and Sengupta (2007) challenge the conventional wisdom regarding the relationship between liquidity and investment in financially constrained firms. Traditional single-period models suggest that increases in net worth or reductions in interest rates lead to higher investments in such firms. The author, however, argue that this may not necessarily hold in a multi-period context. The paper presents a multi-period version of the Holmstrom and Tirole moral hazard model, showing that the probability of investment or the hurdle rate for investment in the first period of a two-period model is non-monotonic in the level of liquid balances. This result contrasts with the typical assumption that higher liquidity unequivocally stimulates investment. In fact, the study finds that firms may become more conservative in their investment decisions as their liquidity improves, reflecting a more strategic allocation of resources over time. The findings have significant implications for understanding the behavior of financially constrained firms, challenging several empirical observations in existing literature. For instance, it addresses the puzzling evidence of higher cash-flow sensitivity of investment in firms with better liquidity positions, suggesting that cash-flow sensitivity is non-monotonic in the level of liquid balances.

Lipson and Mortal(2009) delves into the relationship between equity market liquidity and capital structure, offering nuanced insights into how liquidity influences financial decisions. They discover that firms with more liquid equity tend to have lower leverage and show a preference for equity financing over debt when raising capital. For instance, among firms sorted into liquidity quintiles, those in the most liquid quintile had an average debt-to-asset ratio of about 38%, compared to 55% in the least liquid quintiles. The paper builds on the premise that more liquid firms have a lower cost of equity than their less liquid counterparts. This leads to the hypothesis that firms with higher liquidity should favor equity financing due to the trade-off between the net tax benefit of debt and the net cost of equity. The study also examines year-to-year changes in capital structure resulting from capital market transactions, finding that liquid firms are more inclined to choose equity over debt when raising capital.

Gombola, Ho, and Huang (2015) explore the relationship between leverage, liquidity, earnings management, and capital management in U.S. commercial banks, particularly in the context of regulatory changes like Basel III. This study, scrutinizes how financial strategies and regulatory constraints interact in the banking sector, particularly from 1999 to 2013, a period encompassing the 2008 financial crisis. The research identifies that banks manage earnings by manipulating loan loss provisions (LLPs) and net charge-offs (NCOs). Before regulatory changes in 1989, banks used these tools for capital management, increasing their regulatory capital by reducing NCOs. Post-1989, some studies found no association between LLP and capital management, while others continued to see LLP as a tool for capital management. The authors emphasize the role of earnings management in smoothing income over time, using discretionary items like LLP and NCO. Also, the study discusses the impact of leverage and liquidity on earnings and capital management, noting that holding capital can reduce bankruptcy probability and influence banks' liquidity creation. The relationship between regulatory capital and liquidity is intricate; banks might decrease their regulatory capital ratios when facing higher illiquidity or while creating more liquidity. Additionally, the findings indicate a significant positive relationship between earnings and capital management measures with capital ratios, and a significant negative relationship with liquidity ratios, which suggested that banks with higher leverage or lower liquidity may engage more in earnings management, a critical insight for regulators and policymakers.

Hou, Mo, Xue, and Zhang (2015) present the "q5-model," which includes a newly constructed expected growth factor. The study is grounded in the investment framework by Cochrane (1991), which theorizes that firms with higher expected investment growth should yield higher expected returns than firms with lower expected growth, holding investment and profitability constant. This is attributed to the market valuing additional assets produced from current investment, which are predominantly derived from exploiting future growth opportunities. The authors' approach to constructing the expected growth factor involves a conceptually driven and empirically validated specification for predicting changes in investment-to-assets. They use guidance from existing macroeconomics and corporate finance literature to

identify the relevant variables. The study reports that the expected investment-to-assets changes and the subsequently realized changes are closely aligned, particularly at the one-year horizon, where the expected changes range from -15.21% to 23% across different deciles.

To construct the expected growth factor (denoted REg), the authors sort stocks monthly into two groups (small and big) based on the NYSE market equity median and into three groups based on the expected one-year-ahead investment-to-assets change. The expected growth factor is then formed as the difference between the average returns of the two high and two low Et[d1I/A] portfolios each month. The q5-model, incorporating this new factor, demonstrates strong explanatory power across the cross-section of stock returns and notably outperforms other recently proposed factor models, including the Fama-French (2018) six-factor model. This research not only advances the understanding of expected return variation but also contributes significantly to asset pricing by introducing the important dimension of expected investment growth.

4.3 Methodology and Hypothesis

Methodology of liquidity factor

To develop a factor representing the change in expected investment, we adopt the approach used by Hou (2014). This method involves conducting Fama-MacBeth (1973) cross-sectional regressions, focusing on variables such as Tobin's Q, free cash flow, and changes in Return on Equity (ROE), to effectively predict future investment patterns. In our study, we aim to redefine investment factors by placing a primary emphasis on liquidity. This approach involves a thorough analysis of key liquidity indicators, including the current ratio, operating cash flow ratio, and net working capital ratio. By prioritizing these factors, we seek to gain deeper insights into how liquidity significantly drives investment decisions and overall financial performance. This refined focus promises to yield a more nuanced understanding of the relationship between liquidity and investment efficacy.

Current ratio:

The Current Ratio (CR), a fundamental liquidity metric, plays a crucial role in assessing a company's financial health. It measures a company's ability to pay off its short-term liabilities with its short-term assets. This ratio is calculated by dividing current assets by current liabilities. Current assets typically include cash, cash equivalents, accounts receivable, inventory, and other assets likely to be converted into cash within a year. Conversely, current liabilities encompass debts and obligations due within the same period. A higher current ratio indicates a better liquidity position, suggesting that the company can easily meet its short-term obligations. This ratio is particularly important for creditors and investors as it provides a snapshot of the company's short-term financial stability and operational efficiency.

Operation cashflow ratio:

The Operating Cash Flow Ratio (OCFR), a vital financial metric, offers a clear perspective on a company's liquidity by evaluating its ability to cover short-term obligations with cash generated from its core business operations. This ratio is calculated by dividing the operating cash flow by the company's current liabilities. The operating cash flow, a key component of this ratio, represents the cash generated from a company's regular business activities, excluding long-term capital costs or investment revenue. A higher ratio indicates a stronger position, suggesting the company is well-equipped to handle its short-term liabilities with the cash it produces operationally. This metric is particularly insightful for investors and creditors, as it sheds light on the company's operational efficiency and financial stability. The OCFR is a more direct measure of liquidity than other ratios, as it focuses on cash flows rather than relying on accounting profits, thus providing a realistic view of a company's financial health.

Net Working Capital Ratio:

The Net Working Capital Ratio (NWC) is a key financial indicator used to evaluate a company's operational efficiency and short-term financial health. It measures the ability of a company to cover its current liabilities with its current assets. This ratio is calculated by subtracting current liabilities from current assets and then dividing the result by total assets. Current assets typically include cash, accounts receivable, and inventory, while current liabilities consist of debts and obligations due within a year. A higher ratio indicates a stronger liquidity position, suggesting the company has sufficient resources to manage its short-term obligations and invest in business growth. This ratio is particularly crucial for investors and creditors as it provides insight into the company's liquidity and potential risk of financial distress. The Net Working Capital Ratio also offers a grand view of a company's operational efficiency, reflecting how well it manages its short-term assets and liabilities. However, it's important to interpret this ratio within the context of the specific industry and the company's historical trends.

The regression of the investment and liquidity factors will be:

$$D.I/A \text{ (lag for 1 year)} = \alpha + \beta 1CR + \beta 2OCFR + \beta 3NWC \quad (4.1)$$

Following Hou(2014) q factor, expected investment level will be augmented by the average slope of each factors:

$$EI = \beta 1CR + \beta 2OCFR + \beta 3NWC \quad (4.2)$$

3.2 Hypothesis of debt overhang and firm's indicator

Numerous studies have demonstrated the adverse effects of debt overhang on investment decisions. Myers (1977) highlighted how firms might forgo potentially profitable investments due to the increased likelihood of debt overhang. Subsequent research, including works by Lang (1996), Aivazian (2005), and Cai (2011), further explored this dynamic, revealing a negative impact of long-term debt overhang on future investment levels. He (2011) and Vu (2014) extended this understanding by showing that short-term debt also adversely affects near-future investment, primarily

due to heightened default risks. Our study aims to investigate this negative relationship from a reverse perspective, adding a novel dimension to existing research.

Furthermore, our research incorporates Tobin's Q, operating profitability, and size as control variables in our regression analysis of the debt variable. This approach aligns with the pecking order theory, which posits that firms with high growth opportunities, profitability, and cash flow levels are more likely to minimize debt issuance. This comprehensive framework will enable a more nuanced understanding of the interplay between debt levels and corporate investment strategies. Therefore, our prediction of debt structure can be formalized as:

Debt(T,S,L,)= α+β1Expected investment+ β2Tobin's Q (or change of EPS)+ β3profitablity+ β4size (4.3)

H1: The firms with high growth opportunities tend to be more leveraged.

H2: The firms with high expected investment level tend to be less leveraged.

H3: Profitability will significantly and negatively impact the leverage level of Chinese firms.

H4: The firms with larger size tend to have less leverage level.

4.4 Data analysis and Discussion

4.4.1 descriptive Statistics

The sampling methodology employed in this research encompasses data from Compustat North America Annual Fundamental items and Global Fundamental Annuals. This comprehensive dataset includes a range of financial, market, and statistical details pertaining to firms listed in North America and globally. The time frame covered by the sample extends from 1988 to 2022. In alignment with standard

practices established in prior studies, specific categories of firms have been systematically excluded from the sample. These include all financial and utility firms, as well as government-sponsored entities, identified by Standard Industrial Classification (SIC) Codes ranging from 4000 to 4999, 6000 to 6799, and 9100 to 9999. Additionally, firms that exhibit negative total asset values, negative book values of equity, and negative debt figures have been omitted from the analysis. This exclusion criterion is based on the rationale that such firms often exhibit atypical leverage ratios and other financial metrics, which could skew the results of the study.

Table 4.1. Descriptive statistics for Non-North America Listed firms

Variables	S.Deviation	Mean	P50	Skewness
Current-ratio	2.87	2.74	1.54	3.03
Cash flow	0.1255	0.04	0.025	-1.29
Working capital	0.253	0.185	0.176	0.0386
Investment ratio	0.054	0.05	0.023	1.944
Size	0.7	0.97	0.8	1.24
Profitability	0.8	-0.178	0.05	-4.2
growth	34.31	0.123	0	-0.05
Debt/asset	0.255	0.488	0.484	0.29
s.debt/asset	0.206	0.341	0.315	0.65
l.debt/asset	0.015	0.11	0.05	0.65

Table 1 presents financial data for globally listed firms, offering insights into their liquidity, cash flow, and investment and debt behaviors. The mean current ratio of 2.74 indicates a robust liquidity position among these firms, suggesting that, on average, they possess more than double the current assets needed to cover their short-term liabilities. This reflects a strong capability to meet short-term financial obligations. However, the median current ratio of 1.55 reveals that over half of these firms have a current ratio exceeding 1.54, pointing to generally sound short-term financial health across the sample. The data exhibits a positive skew in the current ratio distribution, suggesting that a significant number of firms have higher current ratios, including some with exceptionally high values. In contrast, the cash flow ratio shows negative skewness, indicating a considerable presence of firms with notably low cash flow

ratios, which pulls the overall average down. The average cash flow, representing 4% of total assets, highlights that a few firms encounter challenges in generating cash. Regarding working capital, a ratio of 0.185 implies a moderate level of net working capital relative to total assets. This ratio suggests a balanced financial position, neither indicating underutilized assets nor signaling liquidity concerns. The investment behavior of these firms is captured by a mean investment ratio of 5%, denoting a moderate level of capital expenditure. This indicates a balanced strategy between maintaining current operations and investing in growth or efficiency enhancements. However, the median investment ratio of 2.5% shows that half of the firms are more conservative in their capital spending, with investment ratios at or below 2.5%. The positive skewness of this distribution confirms that while there are firms with significantly high investment ratios, the majority maintain lower investment levels relative to the mean. The notable difference between the mean and median in this context is characteristic of a positively skewed distribution, highlighting the variability in investment strategies among these global firms.

The size data analysis reveals that, with an average size ratio of 0.95, firms are generally efficient at generating sales from their assets. However, the positive skewness of 1.24, coupled with the disparity between the mean and the median size ratio of 0.8, underscores a significant variation in performance. This indicates that while many firms maintain a standard level of asset utilization, some outliers exhibit exceptionally high sales-to-assets ratios. In terms of EPS growth, the average growth rate of 0.123 implies moderate improvement among the firms. However, this growth is not uniformly experienced across the sample. The substantial standard deviation of 31, combined with a median growth rate of zero, suggests a dichotomy in performance. Some firms are achieving notable EPS growth, while a significant number are not experiencing any growth, contributing to a diverse and complex overall scenario. The operating profitability data, with a mean of -0.178, indicates that the average profitability is negatively impacted by a subset of firms experiencing extremely poor operating profitability. This pulls down the overall average into negative territory. In contrast, the positive median profitability of 0.05 suggests that the majority of firms are able to maintain profitability. However, the pronounced negative skewness of -4.2

highlights significant operational challenges faced by a portion of the group. These challenges are severe enough to notably skew the distribution and shape the overall financial landscape of these firms.

The data reveals that the average debt ratio across the firms is approximately 48.8%, indicating that, on average, nearly half of each firm's assets are financed through debt. This level of indebtedness can be considered moderate, reflecting a balanced approach to financing assets through a mix of debt and equity. The median debt ratio, closely mirroring the mean at 48.4%, further indicates that half of the firms have a lower debt ratio and the other half higher, suggesting a relatively symmetrical distribution across the firms. The positive skewness of the data, although relatively mild, reveals that the distribution leans slightly towards higher debt ratios. This skew indicates the presence of a subset of firms with debt ratios that significantly exceed the average, although not extremely so. Such a distribution points to a range of debt-utilization strategies, where most of the firms maintain moderate leverage, while a minority adopts higher levels of debt. The implications of an average debt ratio of this level are twofold. On one hand, it demonstrates that a considerable number of firms are strategically utilizing debt in their capital structures, potentially to leverage opportunities for growth or investment. On the other hand, the presence of firms with notably higher debt ratios, as suggested by the skewness, could be indicative of elevated financial risk in these particular cases. A moderate average debt ratio often signals a stable financial posture and the potential for growth, as firms may be using debt as a tool to finance expansions or capitalize on investment opportunities. However, firms that are on the higher end of the debt ratio spectrum may encounter challenges, especially in the face of adverse economic shifts or rising interest rates. This nuanced picture highlights the importance of considering individual firm circumstances when assessing financial health and risk, rather than relying solely on average figures.

The significant difference in debt ratios, with the short-term debt ratio (0.341) surpassing the long-term debt ratio (0.11), can be attributed to a few key reasons. Firstly, the higher short-term debt ratio might indicate strategies employed by these firms to manage liquidity. Utilizing short-term debt can be an effective way to handle

variations in cash flow, support working capital needs, or manage immediate financial obligations. Secondly, while short-term debt usually carries lower interest rate risk than long-term debt, it may introduce greater refinancing risk. Firms favoring short-term debt are potentially doing so to minimize borrowing costs or to avoid being locked into higher rates associated with long-term debt, particularly in an environment where interest rates are low. Thirdly, short-term debt offers enhanced financial flexibility in comparison to long-term debt. This approach allows firms to maintain a flexible capital structure, adapting more rapidly to fluctuations in market conditions or to capitalize on new investment opportunities. However, it's important to note that a disproportionately high short-term debt ratio could also be indicative of potential solvency challenges, particularly if firms struggle to generate adequate cash flow to meet these looming financial commitments. Furthermore, a reliance on short-term debt increases the refinancing risk, as these debts will need to be addressed, either through repayment or refinancing, in the short term. Therefore, the maturity profile of the firms' debt becomes a crucial element in assessing their financial stability and in understanding the associated risks.

Table 4.2. Descriptive statistics for North America Listed firms

Variables	S.Deviation	Mean	P50	Skewness
Current-ratio	9.29	2.85	1.82	1.88
Cash flow	2.27	-0.268	0.121	-1.79
Working capital	0.129	0.185	0.181	-0.838
Investment ratio	0.003	0.046	0.027	1.65
Size	0.71	0.81	0.693	0.75
Profitability	0.483	-0.1511	0.029	-2.31
Growth(tobins'Q)	5.82	1.589	0.69	2.17
Debt/asset	0.214	0.531	0.484	1.84
s.debt/asset	0.297	0.312	0.21	2.17
l.debt/asset	0.179	0.18	0.087	1.11

Our analysis reveals that the proportion of debt for North-American firms is comparable to that of non-American firms (0.531 vs 0.49). However, North-American firms appear to have a greater reliance on long-term debts (0.18 vs 0.11). In terms of

Tobin's Q, we observe a substantial difference between the mean and the median (1.59 vs 0.69), likely attributable to its high positive skewness of 2.17. This discrepancy suggests that a select group of firms have significantly higher market valuations relative to their asset replacement cost. This phenomenon could be influenced by factors such as growth opportunities, market dominance, or speculative elements affecting stock prices. Regarding the cash flow ratio, the negative mean contrasts with a positive median of 0.121, a disparity potentially arising from extremely negative outliers. A skewness value of -1.8 indicates a pronounced left-skewed (or negatively skewed) distribution, signifying that while most firms have positive cash flow ratios, a notable number of firms are experiencing substantially low (negative) cash flow ratios, consequently depressing the overall mean.

4.4.2 Results and Discussions of North American listed firms.

Table 4.3. investment ratio and liquidity indicator

variables	L1ir	L3ir
Cratio	0.067	.15
Cashflow	0.041	.339
WcR	0.075	.1865
P-value(Cratio)	0.048	0.00
p-value(cash)	0..00	0.00
pvalue(WcR)	0.074	0.00
R-square	1.4%	4.5%

For each month, cross-sectional regression of expected investment factor (capital expenditure-to-total asset), denoted as L.ir, has been performed on the logarithm of current ratio (Cratio), Cashflow ratio, and the working capital ratio (WCR). All the variable has been winsorized at 1-99% level. Following Hou (2018), the average slopes in calculating L.ir are estimated from prior 120-month (30 month minimum) rolling window.

The empirical results conclusively demonstrate that all three driving factors – current ratio, operating cash flow, and net working capital – have a significant and positive correlation with future investment, with this relationship becoming even more pronounced in the long-term. This indicates that a robust liquidity position endows a company with the agility to swiftly seize investment opportunities as they emerge. Such financial nimbleness is a critical competitive edge, particularly in markets characterized by rapid evolution and change.

Specifically, the current ratio (Cratio) exerts a significant impact on future investments, evidenced at a 5% significance level in the short term and an even more pronounced 1% level in the long term. Companies with a higher current ratio possess a greater proportion of liquid assets relative to their short-term liabilities, a key factor in securing funding for new ventures. This robust liquidity, indicative of a firm's strong financial capacity, enables investments in future projects while safeguarding short-term financial health. Additionally, a substantial current ratio often correlates with reduced risk perception among internal decision-makers and external financiers. This lowered risk perception typically facilitates easier access to external funds under more favorable conditions, thereby bolstering investment capabilities. The enhanced visibility of this relationship in the long term can be attributed to two primary factors. Firstly, a consistently elevated current ratio is reflective of enduring liquidity and overall financial wellness, crucial attributes for long-term investment strategies where a sustained financial outlook is imperative. Secondly, the assurance of long-term financial stability empowers companies to commit to significant investments, secure in the knowledge that they possess a sufficient buffer to mitigate potential short-term financial upheavals.

The empirical data reveals that high operating cash flow significantly and positively influences future investments, both in the short and long term. This trend can be attributed to several key factors. First and foremost, a high operating cash flow signifies that the company is efficiently generating ample cash from its core business activities, providing essential resources for investments without the need for external financing. Secondly, firms with robust operating cash flows are capable of internally

funding their investments, thereby circumventing the expenses and limitations often associated with external borrowing or equity issuance. Additionally, a consistent and positive cash flow stream from operations facilitates more effective long-term strategic planning, enabling the company to depend on a reliable internal fund supply for future investment endeavors. Lastly, companies with substantial operating cash flows are generally better equipped to manage the risks associated with investments, thanks to their stable financial cushion, which can offset potential unforeseen challenges.

Net working capital significantly and positively influences future investments, a relationship that becomes more pronounced over the long term (evident at a 10% significance level in the short-term and a more compelling 1% level in the long-term). This trend may be attributed to several underlying factors. First, net working capital is a critical indicator of a company's ability to efficiently meet short-term obligations and manage day-to-day operations. A positive net working capital not only supports current operational needs but also provides essential liquidity for future project investments. Second, effective management of working capital, characterized by the efficient handling of receivables, payables, and inventory, often translates into operational efficiency, enabling companies to liberate additional cash for investment purposes. Third, the long-term consistency in managing working capital is indicative of a company's sustained ability to balance liquidity with investment needs, which is vital for strategic planning and the financing of extensive projects that span multiple years. Lastly, over the long term, sound working capital management contributes to improved risk management and potentially lowers the cost of capital. Financial stability minimizes risk, potentially leading to reduced borrowing costs and more favorable conditions for investment.

Table 4.4. Future investment and total debt overhang

total debt	Coe	t	P-value
EI	-0.055	-2.6	0.00
Size	0.29	4.6	0.00
profit	-0.019	-1.01	0.31
grow	-0.09	-3.55	0.00

R-squred	2.3%

Based on the analysis, aside from profitability (EBIT/Sales), all other examined variables demonstrate a highly significant relationship with debt overhang at the aggregate level. Notably, both the Expected Investment Level (EI) and growth exhibit a negative impact on debt overhang, whereas size has a positive effect on the level of debt overhang.

The negative impact of the expected investment level on debt overhang can be attributed to a variety of reasons. First, higher anticipated investment levels typically signify a company's intention to reinvest its earnings back into its operations. This capacity for self-financing diminishes the necessity for external borrowing, thereby reducing the likelihood of debt overhang. Second, as companies gear up for increased investment, their reliance on debt financing for future projects tends to decrease, alleviating the weight of prospective debt obligations and the associated overhang. Third, heightened investment often correlates with expectations of increased future earnings, which can be strategically deployed to service existing debt more efficiently, thus diminishing the risk of debt overhang. Fourth, elevated investment expectations usually result in an expansion of the company's asset base, enhancing borrowing capacity and creditworthiness, and in turn, mitigating concerns surrounding debt overhang. Finally, greater expected investments can draw more equity investors, signaling robust growth and profitability. This surge in equity financing can lessen the dependency on debt financing, effectively minimizing debt overhang. In essence, the anticipated high level of investment negatively impacting debt overhang is indicative of a company's solid financial planning and growth outlook, highlighting a strategic pivot towards self-financing and equity over debt.

The positive correlation between firm size and debt overhang can be interpreted through various financial lenses. Firstly, larger firms typically possess an enhanced capacity to borrow, attributable to their considerable size, diverse operations, and well-established market presence. Such an expanded borrowing capacity often results in a heightened absolute level of debt, which can contribute to debt overhang. Secondly,

the market and financial institutions tend to view larger firms as more creditworthy, a perception that facilitates their access to debt financing and may lead to increased debt levels. Thirdly, the often-complex financial operations and structures of larger firms, encompassing a range of debt instruments, can lead to an accumulation of debt, thereby amplifying the risk of overhang. Lastly, in their pursuit of maintaining or expanding market dominance, larger firms may accrue additional debt to fund these strategic goals. While this approach can stimulate growth, it also has the potential to exacerbate debt overhang. In summary, the positive effect of firm size on debt overhang can be attributed to larger firms' increased capacity and willingness to take on debt, their substantial asset bases used as collateral, complex financial structures, and strategic decisions driven by market dynamics and growth opportunities. While these factors can contribute to a firm's growth and market position, they can also lead to increased debt levels, potentially resulting in debt overhang.

The negative influence of firm growth on debt overhang is attributable to several fundamental factors. First, as firms experience growth, they typically see an increase in internal cash flows, enabling them to fund more of their expansion from within. This reduces their dependency on external debt, thereby lessening the risk of accumulating excessive debt. Second, the enhanced financial health and profitability associated with growth strengthen a firm's credit standing, which may lead to more favorable borrowing terms and a diminished need for high-cost debt. Third, growth often brings about economies of scale, leading to greater operational efficiency and improved profit margins, thereby bolstering the firm's capacity to manage and service existing debt. Lastly, a growing firm frequently attracts more equity investment due to its promising outlook. This influx of equity investment can alleviate the necessity for debt financing, further mitigating the risk of debt overhang. Overall, this combination of factors contributes to a negative relationship between firm growth and the risk of debt overhang, as a growing firm is usually in a stronger position to manage its debt obligations effectively.

In our analysis, we find no significant relationship between profitability and total debt

overhang, which can be elucidated by several reasons. Firstly, when existing debt levels are high, even a considerable increase in profitability may not sufficiently diminish the debt relative to the company's value, thereby failing to alleviate the debt overhang condition. Secondly, the market and creditors might not react promptly to increased profitability, particularly if there are doubts about the long-term sustainability of these profits. Consequently, the perceived risk and associated cost of debt could remain elevated, perpetuating the debt overhang scenario. Thirdly, if a company opts to reinvest its profits back into the business instead of reducing its debt, this decision may not significantly improve the debt overhang situation. Overall, while profitability is an affirmative sign of a company's financial health, its influence in significantly impacting debt overhang may be constrained by factors such as the magnitude of existing debt, debt terms, market perceptions, and strategic choices in the allocation of profits.

Table 4.5. short-term debt and expected investment

short-term debt	Coe	t	P-value
EI	-0.015	-0.89	0.38
Size	0.304	14.45	0.00
profit	-0.016	-11.01	0.00
grow	-0.1035	-2.97	0.00
R-squared	5.1%		

According to our analysis, with the exception of expected investment, all other evaluated variables show a profoundly significant correlation with short-term debt overhang. Specifically, both profitability and growth negatively influence debt overhang, indicating that as these factors increase, debt overhang tends to decrease. Conversely, firm size positively impacts the level of debt overhang, suggesting that larger firms are more prone to experiencing higher levels of short-term debt overhang.

According to our findings, the expected level of future investment does not exert any discernible influence on short-term debt overhang. This can be attributed to several

key reasons. Firstly, short-term debt overhang is primarily focused on a company's current liabilities and immediate financial obligations. Therefore, plans for future investment, which are inherently long-term, do not tend to significantly affect short-term financial constraints or debt structures. Secondly, the market and creditors may delay in reacting to, or might not fully factor in, future investment plans when evaluating a company’s short-term debt risk. Thirdly, the potential impact of future investment plans on short-term debt is often indirect and may not be immediately evident, particularly in the context of financial reporting or credit assessments. Overall, the future investment level may not influence short-term debt overhang because short-term financial management is typically more concerned with current liquidity, cash flow sufficiency, and immediate debt obligations. Long-term investment plans, while important for a company's growth and future financial health, may not directly alter the short-term debt landscape or the immediacy of debt servicing requirements.

Our analysis reveals that the size of a firm has a strong and positive correlation with short-term debt overhang, a relationship that can be elucidated by several factors. Firstly, larger firms often strategically utilize debt financing to leverage their size and market position. While this approach facilitates growth and expansion, it concurrently elevates the risk of short-term debt overhang. Secondly, to maintain or enhance their competitive standing, these firms may resort to short-term debt to finance strategic initiatives such as acquisitions, research and development, and market expansion. Thirdly, firms of larger size, possessing significant assets, often use these assets as collateral to secure short-term debt. This practice, although increasing their borrowing capacity, simultaneously escalates their short-term debt obligations. Lastly, even though larger firms benefit from economies of scale, they also incur substantial operational costs, which are frequently financed through short-term debt, further contributing to an increase in debt overhang. In summary, the positive relationship between firm size and short-term debt overhang can be understood through the lens of increased borrowing capacity, complex financial needs, strategic initiatives requiring financing, and the operational dynamics of large corporations. While these factors can contribute to a firm's growth and market strength, they can also lead to a heightened level of short-term debt, thus increasing the risk of debt overhang.

Our analysis indicates that profitability has a significant and negative impact on short-term debt overhang, attributable to several key factors. Firstly, profitable firms, having higher cash availability, tend to depend less on short-term borrowing for their operational expenses, thereby diminishing the likelihood of short-term debt overhang. Secondly, enhanced profitability bolsters a company's capacity to comfortably meet its existing debt commitments, effectively reducing the risk of debt accumulation and subsequent overhang. Thirdly, companies demonstrating strong profitability are often viewed more favorably by creditors, leading to potentially advantageous borrowing terms. Such terms may include reduced interest rates or extended repayment periods, alleviating the burden of short-term debt. overall, profitability helps ensure a firm's financial stability and capacity to manage its debts effectively, especially in the short term. By enhancing cash flows, improving debt servicing ability, and elevating creditworthiness, profitability directly contributes to reducing the likelihood and impact of short-term debt overhang.

Our research indicates that the growth of firms significantly and negatively impacts short-term debt overhang. This relationship can be explained by several key factors. Firstly, firm growth typically results in increased revenues and often higher profitability, leading to enhanced cash flows. This improvement positions firms more favorably to meet short-term financial obligations and thus reduces the potential for debt overhang. Secondly, growing firms are often perceived as more creditworthy, facilitating access to favorable financing options, and decreasing reliance on high-risk short-term debt. Thirdly, growth frequently yields economies of scale, resulting in lower operational costs in relation to revenues. This increased efficiency can liberate cash reserves, which might otherwise be allocated to debt management, consequently diminishing the risk of short-term debt overhang. Lastly, the adaptability of growing firms to market fluctuations enhances their ability to effectively confront financial challenges and sidestep scenarios that may cause debt overhang. In a word, firm growth contributes to improved cash flows, financial health, operational efficiencies, and market perception, all of which play a crucial role in reducing the likelihood of short-term debt overhang. As a firm expands and strengthens, it becomes more capable

of managing its debt obligations without falling into a debt overhang scenario.

Table 4.6. long-term debt and expected investment

long-term debt	Coe	t	P-value
EI	-0.033	-2.41	0.016
Size	0.363	7.88	0.00
profit	-0.0144	-2.12	0.03
grow	-0.032	-1.54	0.12
R-squared	5.1%		

Our analysis reveals that, except growth, all other assessed variables exhibit a highly significant relationship with long-term debt overhang (only grow has p-value over 0.1). Notably, both profitability and Expected Investment (EI) demonstrate a negative impact on debt overhang. This indicates that as profitability and EI increase, the likelihood of long-term debt overhang correspondingly decreases. In contrast, the size of a firm positively correlates with the level of debt overhang, implying that larger firms are more susceptible to higher degrees of long-term debt overhang.

The negative influence of the expected investment level on long-term debt overhang can be explained through several key factors. Firstly, elevated levels of anticipated investment typically indicate prospects for growth and future revenue enhancement. Such anticipated growth can fortify the company's financial standing over time, thereby augmenting its capacity to manage and diminish long-term debt. Secondly, the strategic reinvestment of profits into forthcoming projects tends to curtail the propensity for excessive debt accrual, as the firm increasingly relies on internally generated funds over external borrowing. Thirdly, investment activities generally result in the expansion of the firm’s asset base. This augmentation in assets can bolster the firm’s borrowing capabilities and creditworthiness, subsequently diminishing the dependency on additional long-term debt. Fourthly, firms actively engaged in investment for their growth and prospects often attract a more favorable perception from creditors and investors, potentially leading to more advantageous financing terms. Overall, expected high levels of investment indicate a company's commitment to future growth and financial stability, leading to better cash flow management, asset

expansion, and positive market perceptions. These factors collectively contribute to reducing the risk of long-term debt overhang by enhancing the company's ability to service and manage its debt effectively.

The positive influence of firm size on long-term debt overhang can be understood through various factors. Firstly, larger firms typically enjoy broader access to capital markets and have a heightened capacity to borrow, a consequence of their substantial size, asset base, and market presence. Consequently, this often leads to these firms incurring higher absolute levels of debt. Secondly, larger firms are frequently perceived as more creditworthy by lenders, facilitating their ability to secure larger amounts of debt financing. This accessibility can, over time, amplify the risk of long-term debt overhang. Thirdly, in their efforts to maintain or elevate their market standing, larger firms may regularly depend on debt financing, which can result in the accumulation of significant long-term debt. Fourthly, the complex operations of larger firms typically necessitate diverse and considerable financing needs, which are often addressed through various forms of long-term debt. Lastly, despite the advantages of economies of scale, larger firms are also faced with substantial operational and administrative expenses, which are frequently financed through long-term debt. In summary, the positive impact of firm size on long-term debt overhang reflects the larger debt capacities, strategic financial decisions, and operational complexities associated with larger firms. While these elements can contribute to the firm's growth and market strength, they can also lead to a heightened level of long-term debt, increasing the risk of debt overhang.

The negative impact of firm size on long-term debt overhang can be elucidated through several factors. Initially, high operating profitability usually indicates robust cash flows, enabling a firm with significant cash flows to better service its debt. This diminishes the risk of debt overhang, a situation where a firm, overwhelmed by debt, is unable to pursue profitable projects due to the prioritization of creditor repayments. In essence, strong operating profits help mitigate debt overhang risk by equipping the firm with necessary resources to fulfill its debt responsibilities. Additionally, profitable operations endow a firm with enhanced flexibility in managing its debt

portfolio. Options may include refinancing under more advantageous terms, early debt repayment to decrease leverage, or restructuring debt to align more effectively with the company's cash flow trends. Lastly, a firm exhibiting high operating profitability tends to depend less on external financing, including long-term debt. This reduction in leverage inherently lowers the possibility of debt overhang, as the firm is not heavily burdened by debt. Essentially, profitable operations can underpin growth and investment, diminishing dependence on external debt.

The notion that the growth of a firm may not significantly impact long-term debt overhang can be understood through several key considerations. Firstly, if a firm's existing debt has restrictive covenants or high interest rates, growth may not necessarily alleviate the burden of this debt. Even if the firm is growing, the terms of the existing debt might still impose significant financial constraints, maintaining the state of debt overhang. Secondly, growth in terms of revenue or market share does not always translate to increased profitability. If the growth is not profitable or does not generate sufficient cash flows, it might not contribute effectively to reducing the burden of long-term debt. In some cases, growth can even exacerbate financial strain if it requires substantial reinvestment or if it's fueled by additional borrowing. Thirdly, the market's perception of a firm's growth can be complex. If investors and creditors view the growth as unsustainable or risky, it might not lead to improved terms for existing or new debt. This skepticism can limit the firm's ability to restructure or refinance existing debt, thus not alleviating the debt overhang situation. Fourthly, rapid growth can sometimes bring operational and financial risks, such as overexpansion or mismanagement of resources, which might not favor debt reduction. This can, in some cases, lead to increased financial instability, further complicating the debt overhang situation.

4.4.3 Results and Discussions of Global listed firms.

Table 4.7. investment ratio and liquidity indicator (Global firms

variables	L1ir	L3ir
Cratio	-0.016	.038

Cashflow	-0.047	-.0025
WcR	-0.073	.00383
P-value(Cratio)	0.000	0.00
p-value(cash)	0..008	0.00
pvalue(WcR)	0.000	0.00
R-square	1.2%	0.55%

For each month, cross-sectional regression of expected investment factor (capital expenditure-to-total asset), denoted as L.ir, has been performed on the logarithm of current ratio (Cratio), Cashflow ratio, and the working capital ratio (WCR). All the variable has been winsorized at 1-99% level. Following Hou (2018), the average slopes in calculating L.ir are estimated from prior 120-month (30 month minimum) rolling window.

The analysis reveals that liquidity indicators exert a significant influence on the investment ratio, impacting both short-term and long-term investments. Interestingly, this impact tends to be negative for the short-term investment ratio. The relationship between the current ratio and investment ratios, characterized by a negative effect on the short-term investment rate and a positive impact on the long-term investment ratio, can be elucidated through several key reasons.

Firstly, firms that exhibit high liquidity may prioritize maintaining cash or near-cash assets. This strategy is often employed to swiftly address unforeseen circumstances or capitalize on immediate market opportunities, rather than committing resources to short-term investments. The preference to keep assets liquid for quick response and flexibility results in a reduced inclination towards short-term investments. Conversely, a high current ratio is indicative of strong financial health and the presence of readily available funds, factors that are likely to foster long-term investments. Firms enjoying a robust liquidity position are typically more equipped to strategically plan and finance long-term projects. These projects, which could range from infrastructural developments to research and development initiatives or business expansion plans, are viable without compromising short-term financial commitments. Additionally, a strong current ratio can enhance a firm's creditworthiness. This improved financial

standing makes it more feasible for firms to secure financing for long-term investments. Lenders and investors tend to perceive companies with good liquidity as lower-risk propositions, potentially leading to more advantageous borrowing terms and increased opportunities for raising capital. Overall, while high liquidity levels may deter short-term investments due to a preference for maintaining flexible and readily accessible assets, they concurrently facilitate long-term investments by signaling financial stability and enabling access to capital under favorable conditions.

The findings regarding the Working capital ratio reveal a contrasting relationship with investment timescales: a negative correlation with short-term investments but a positive one with long-term investments. This dichotomy can be rationalized through the following explanations. On one side, a high working capital ratio, indicative of a firm possessing significant current assets relative to its current liabilities, suggests a focus on maintaining liquidity and ensuring operational stability. Firms with robust working capital ratios might prioritize safeguarding against risks, thereby opting to preserve liquidity to meet short-term obligations or keeping cash reserves for unforeseen necessities. This conservative approach towards liquidity management typically results in a lesser inclination towards short-term investments, as firms might choose to avoid allocating their readily available assets to such ventures. Conversely, firms boasting strong working capital positions are likely to strategically channel their resources into long-term investments. This is part of a broader vision aimed at growth and expansion. The presence of substantial working capital affords these firms the financial leeway to plan and invest in long-term projects. They enjoy the liberty of focusing on future growth initiatives without the immediate stress of short-term financial liabilities impeding their strategic decisions. In a word, while a high working capital ratio often leads firms to adopt a cautious stance on short-term investments, it simultaneously empowers them to pursue long-term investment opportunities. This strategic allocation underscores a balance between immediate financial prudence and future-oriented growth objectives.

When comparing the financial behaviors of U.S.-listed firms with global firms, a

contrasting relationship emerges between the current ratio, working capital ratio, and short-term investment ratio. This divergence can be ascribed to number of factors that stem from distinct economic conditions, regulatory frameworks, market dynamics, and business practices. First and foremost, U.S. firms are situated within a relatively stable and mature economy, which often propels them towards a more assertive investment stance, even in the presence of high liquidity as denoted by a substantial current ratio. For these U.S. companies, excess liquidity is frequently seen as a springboard for investing in short-term projects, aiming to secure competitive edges. In stark contrast, global firms, particularly those in emerging markets or in economies marked by greater instability, tend to adopt a more conservative approach. High liquidity or a significant current ratio for these firms often acts as a safeguard against economic unpredictability's, thus influencing a more reserved outlook towards short-term investments. Secondly, the ease of access to developed and efficient capital markets is a distinctive advantage for U.S. firms. This accessibility fosters a positive correlation between liquidity and investment, enabling firms to readily seek additional financing when necessary, even amidst high liquidity levels. On the other hand, global firms often grapple with more restricted access to capital, facing either stringent constraints or elevated costs. Consequently, these firms are more inclined to depend on internal funding, leading to a cautious deployment of their current assets in short-term investments. Thirdly, the unique regulatory environment and financial reporting standards prevalent in the U.S. significantly shape how firms manage their assets and liabilities, thereby influencing their investment decisions. Contrarily, in other regions, diverse regulatory norms and financial practices can lead to alternative strategies in managing liquidity and investment decisions. Furthermore, the approaches to risk management, corporate governance, and the prevailing corporate culture exhibit notable variances between U.S. and global firms. These differences critically shape firms' perceptions and strategies in balancing liquidity against investment opportunities. In summary, these multifaceted factors collectively contribute to the differing financial strategies and decisions observed between U.S.-listed firms and their global counterparts, particularly in how they manage liquidity and approach short-term investment opportunities.

Table 4.8. Future investment and total debt overhang (Non-US)

total debt	Coe	t	P-value
EI	-0.004	-0.6	0.85
Size	0..09	46.83	0.00
profit	-0.003	-4.216	0.00
grow	0.02	11.68	0.00
R-squared	2.3%		

The analysis indicates that there is no notable correlation between total debt overhang and expected investment (p-value of 085). This lack of a significant relationship can be attributed to various factors. Firstly, the influence of debt on investment decisions is highly variable among firms, influenced by unique aspects such as the company's size, the sector it operates in, its stage of growth, and its risk profile. These distinctive characteristics can significantly dilute any clear-cut relationship between debt overhang and expected investment when considering a diverse array of firms. The impact of debt may vary greatly from one firm to another, making a uniform pattern difficult to discern across a broad sample. Additionally, market perception plays a pivotal role. If the market views a firm's debt level as manageable and believes in the firm's potential for robust future growth, the typically negative implications of debt overhang on investment decisions might be substantially reduced. In such scenarios, investor confidence becomes a key determinant in a firm’s investment choices, overriding the potential constraints imposed by existing debt levels. Thirdly, the dynamics between debt and investment are likely to be more complex than a simple linear relationship. It's plausible that debt begins to significantly influence investment decisions only after surpassing a certain threshold. This implies that within the sample, if most firms have debt levels below this critical threshold, a meaningful relationship between debt and investment might not be apparent. In essence, the absence of a significant link between total debt overhang and expected investment reflects the intricate interplay of individual firm characteristics, market perceptions, and the possibly non-linear nature of the debt-investment relationship.

The differing relationships between debt overhang and expected investment in U.S.-listed firms and global firms can be attributed to a variety of factors that are specific to the economic, regulatory, and market environments in which these firms operate. Here are some key reasons for these differences. Firstly, U.S. firms are part of a highly developed, stable economic environment with well-established financial markets. This stability might make the negative impacts of debt overhang more pronounced as investors and managers in these markets are potentially more sensitive to debt levels when making investment decisions; but Global firms, particularly those in emerging markets or less stable economies, might not exhibit a clear relationship between debt overhang and investment due to varying economic conditions, differing levels of market efficiency, and other macroeconomic factors. Secondly, U.S. firms generally have better access to diverse funding sources. High debt levels could discourage further borrowing due to increased risk and potentially higher costs of capital, leading to reduced investment; while global firms, especially those in emerging markets, might have limited access to capital. These firms might not exhibit a significant relationship between debt and investment because their investment decisions are influenced more by factors other than existing debt levels, such as availability of foreign investment, government policies, or international economic conditions. Thirdly, The U.S. has stringent regulatory and financial reporting standards. These standards might make the consequences of high debt more transparent and consequential for U.S. firms, affecting their investment decisions. For global firms, varying regulatory standards and practices could result in different approaches to handling debt and investments, thereby diluting any consistent relationship between debt levels and investment decisions.

Table 4.9. Future investment and short-term debt overhang (Non-US)

short-term debt	Coe	t	P-value
EI	-0.0003	-0.42	0.65
Size	0.045	30.67	0.00
profit	-0.022	11.68	0.00
grow	0.016	-9.72	0.00
R-squared	1.7%		

The findings indicate that there is no obvious association between the expected

investment factor and short-term debt overhang (p-value of 0.65). This observation aligns with the patterns identified in U.S.-listed firms. Both company size and growth have a significant and positive influence on short-term debt overhang (p-values are 0.00). Conversely, profitability exhibits a negative relationship with short-term debt overhang. Unlike U.S.-listed firms, the growth factor demonstrates a positive relationship with short-term debt overhang in other contexts. This suggests that, in certain scenarios, U.S. firms might be more inclined to rely on short-term debt, potentially due to more accessible borrowing options. Also, The risk tolerance of U.S. firms and the expectations of their investors can differ from those in other countries. This can affect the firm's willingness to invest under high levels of long-term debt.

Table 4.10. Future investment and long-term debt overhang (Non-US)

long-term debt	Coe	t	P-value
EI	0.00004	0.75	0.45
Size	0.0597	23.94	0.00
profit	-0.04	-29.3	0.00
grow	0.046	-1.54	0.00
R-squared	5.1%		

Contrasting with the findings from the U.S., research on non-U.S. firms indicates a lack of significant relationship between long-term debt overhang and the expected investment factor (p-value of 0.45). A primary reason for this disparity could be that global firms often have more diversified operations and revenue streams, which may lessen the impact of long-term debt on investment decisions. Additionally, their international exposure can present unique growth opportunities and risks. Similar to U.S. firms, both size and growth exhibit a significant and positive relationship with long-term debt overhang. However, the influence of profitability is significant and negative.

4.5 Implications and contributions

4.5.1 Understanding Debt Overhang:

The study offers profound insights into the nature of debt overhang and its implications for investment decisions. It underscores the underinvestment problem that arises when firms with substantial existing debt forego new profitable projects. This phenomenon is more pronounced in U.S.-listed firms, where a clear negative relationship between debt overhang and expected investment is observed. This implies a heightened sensitivity to debt levels in decision-making processes in these markets.

4.5.2 Liquidity Management and Investment Decisions:

The analysis also sheds light on the critical role of liquidity in investment decision-making. It highlights how different approaches to liquidity management, as seen in the contrasting behaviors of U.S.-listed and global firms, can significantly influence investment strategies. This has implications for firms' operational flexibility and strategic planning, particularly in terms of short-term and long-term investments.

4.5.3 Global Market Dynamics:

The contrasting relationships between debt overhang and investment in U.S.-listed versus global firms underline the influence of global market dynamics. It suggests that firms operating in multiple markets need to adapt their financial strategies to different regulatory environments and market conditions.

4.5.4 Strategic Implications of Debt Maturity Structures:

The study contributes to understanding how debt maturity structures impact investment decisions. It offers a strategic perspective on balancing short-term and long-term debt to manage debt overhang risks effectively. This is especially relevant for firms in capital-intensive industries or in economic environments with restricted access to capital.

4.5.5 Implications for Small Businesses and Emerging Markets:

While the focus is often on large firms, the study reveals that small businesses and firms in emerging markets can also be significantly impacted by high levels of debt. This points to the need for tailored financial strategies and risk management practices suitable for different business sizes and market conditions.

4.5.6 Economic Conditions and Investment Decisions:

The study highlights how economic conditions play a crucial role in the relationship between debt overhang and investment decisions. Firms must be cognizant of economic cycles and market conditions when strategizing their debt management and investment plans.

4.5.7 Corporate Governance and Risk Management:

The findings stress the importance of robust corporate governance and effective risk management practices. Firms need to strategically manage their capital structure and liquidity to balance risk and growth opportunities effectively.

4.6 limitations and Future recommendations

This paper offers valuable insights into the interplay between liquidity, expected investment, and debt overhang. However, it has some limitations. Primarily, its focus on U.S.-listed and global firms within specific timeframes limits the generalizability of findings across different firm types and economic conditions. Additionally, the cross-sectional analysis method used overlooks time-weighted influences. The definitions and measurements of key variables like liquidity and investment are subject to different interpretations, potentially affecting outcomes. Data sourced from databases like Compustat may be biased, omitting smaller, non-public firms, or those in emerging markets, potentially skewing results. Also, the study might not fully capture industry-specific dynamics that significantly influence debt and investment decisions.

Future research could address these limitations. Expanding the study to include a more diverse range of firms, such as smaller, private, or emerging market firms, would enhance generalizability. Longitudinal studies could provide deeper insights into how these relationships evolve over time and across economic cycles. Qualitative methods like case studies or interviews could yield a richer understanding of firms' decision-making processes. Utilizing varied methodological approaches or advanced statistical techniques, like the EWMA model, could reveal new facets of the debt-investment relationship. Investigating the impact of technological advancements and innovation on investment and financing decisions is particularly pertinent in today's landscape. Additionally, exploring the influence of sustainability and ESG (Environmental, Social, Governance) factors on these decisions could offer crucial insights for contemporary firms.

4.7 conclusion

This paper has delved into the intricate relationships between liquidity, expected investment, and debt overhang in both U.S.-listed and global firms. The study revealed critical insights into how these financial aspects interact and influence firm behavior and strategic decision-making. The introduction and literature review establish the importance of understanding how debt overhang, a situation where existing debt burdens inhibit new investments, affects corporate strategy, especially during economic downturns. The methodology involves constructing a q-factor based on liquidity indicators to assess the impact on long-term and short-term debt overhang. Data analysis reveals significant relationships between liquidity, firm size, profitability, growth, and debt overhang. The sampling methodology employed in this research encompasses data from Compustat North America Annual Fundamental items and Global Fundamental Annuals. This comprehensive dataset includes a range of financial, market, and statistical details pertaining to firms listed in North America and globally. The time frame covered by the sample extends from 1988 to 2022.

Specifically, the empirical results of the US-listed firms indicate that three key factors – current ratio, operating cash flow, and net working capital – positively correlate with future investments. A strong current ratio, indicative of liquid assets, enhances a firm's ability to fund new ventures and manage risks, showing even greater significance in the long term. High operating cash flow, reflecting efficient revenue generation, enables internal funding of investments and strategic planning. Net working capital is crucial for short-term operations and long-term investments, improving operational efficiency and financial stability, thus fostering investment capabilities. These factors collectively contribute to a firm's agility in seizing investment opportunities, especially in dynamic markets. For non-US listed firms, In the short term, high liquidity leads firms to prioritize cash assets for flexibility and quick market response, resulting in lower short-term investments. In contrast, for long-term investments, strong liquidity signals financial health and access to funds, encouraging strategic planning and financing of extensive projects. High liquidity enhances a firm's creditworthiness, making it easier to secure financing under favorable conditions. Thus, while high

liquidity may reduce short-term investments, it supports and enables long-term investment strategies.

Finds of US firms show that most variables, except profitability, significantly correlate with debt overhang. Expected Investment Level (EI) and firm growth negatively impact debt overhang, while firm size positively affects it. High EI suggests self-financing capabilities, reducing debt reliance and overhang risk. Larger firms, with greater borrowing capacity, face more debt overhang. Growth reduces overhang risk by increasing internal cash flows and creditworthiness. Profitability's weak correlation with total debt overhang may be due to high existing debt levels and market perceptions. In short-term scenarios, profitability and growth reduce debt overhang, whereas firm size increases it. EI shows no significant short-term impact. Long-term analysis mirrors these trends, with firm size contributing to debt overhang, while profitability and EI reduce it. The study underscores different factors' influences on debt overhang, highlighting the complexity of financial management in varying time frames. On another hand, non-US firms reveal no significant link between total debt overhang and expected investment, attributed to firm-specific characteristics, market perceptions, and potentially non-linear debt-investment dynamics. U.S. firms, in a stable economic environment with strict regulations, show a more pronounced impact of debt on investment decisions compared to global firms in diverse economic and regulatory contexts. The study also finds size and growth positively influencing short-term debt overhang, while profitability negatively affects it. In global firms, there's no significant relationship between long-term debt overhang and expected investment, possibly due to diversified operations and international exposure. Size and growth positively correlate with long-term debt overhang, but profitability negatively impacts it.

The research, while extensive, is limited by its focus on specific firm groups and timeframes. Future studies could expand the scope to include a wider range of firms and longitudinal analyses to capture evolving economic trends. Additionally, qualitative methods could complement the quantitative data to gain deeper insights into the decision-making processes within firms. This study reinforces the complexity

and diversity of financial strategies among firms worldwide. It highlights the need for a dynamic and nuanced approach to corporate finance, one that takes into account the myriad of factors influencing a firm's decision-making landscape.

Chapter5

Implication, Future Recommendations, and Conclusion of the Thesis

5.1 Implication and Recommendations

This thesis offers a comprehensive analysis of capital structures and debt overhang issues in firms across China, the U.S., and globally. It delves into theories like the trade-off theory, agency theory, and Myers and Majluf's pecking order theory, applying these concepts to a variety of market contexts. The research highlights the distinct capital structures in Chinese companies, examines the interplay between debt overhang, investment, and economic cycles in the U.S., and incorporates a global view on debt overhang, liquidity, and investment strategies. By combining theoretical models and empirical data, the study provides insights into how capital structures are shaped by market dynamics and economic fluctuations. The thesis concludes with recommendations for future research, considering diverse perspectives in this field.

Regional analysis:

A deeper analysis of regional differences in capital structures could be insightful. Examining how different economic policies, cultural factors, and market conditions in various regions affect corporate capital structures would provide a more comprehensive understanding.

Sector studies:

Certain industries may have unique capital structure dynamics due to their specific operational and investment requirements. Detailed studies on these industries would add valuable sector-specific insights.

Integration of advanced technology:

Research could focus on how emerging technologies, like blockchain and fintech innovations, are impacting debt issuance decisions. This could include studying the role of cryptocurrencies and digital assets in corporate financing.

Behavior finance perspective:

Incorporating behavioral finance to understand how psychological factors and cognitive biases of managers and investors influence capital structure decisions could offer a different perspective.

Policy influencing:

Investigating the influence of government policies and regulations on capital structures, especially in emerging and frontier markets, is crucial. In these markets, where legal and financial systems are still evolving, policy shifts can significantly impact corporate capital structures. This research could guide the development of more effective policies aimed at enhancing financial stability and growth in these dynamic markets. Understanding these impacts is particularly important in regions where policy changes frequently affect the business environment and financial strategies of companies.

ESG considerations:

Examining the impact of Environmental, Social, and Governance (ESG) factors on capital structure decisions in more depth would be valuable. As companies are increasingly evaluated on these criteria, understanding how they influence debt structure is crucial.

Impact of Crises:

Analyzing the impact of global crises, such as the COVID-19 pandemic, on capital structures and debt overhang could provide valuable insights. This could include studying the short-term and long-term effects on various industries.

5.2 Conclusion of Thesis

This thesis explores the complex relationship between debt overhang and investment levels. It revisits Myers' (1977) and He's (2014) contrasting views on this relationship, contributing a unique perspective by examining how expected investment levels influence debt overhang. The research provides an in-depth analysis of capital structures and debt overhang across markets in China, the U.S., and globally, specifically investigating if Chinese firms adhere to the pecking order theory as proposed by Myers and Sunders (1999). The study's results highlight how capital structure and debt overhang are intricately linked to market conditions, macroeconomic cycles, and unique corporate attributes. This investigation challenges the broad applicability of the pecking order and trade-off theories, particularly in the Chinese context where profitability and short-term debt significantly affect investment decisions. In the U.S. market, expected investment and economic cycles emerge as crucial determinants of debt issuance. Globally, the study reveals diverse impacts of liquidity and debt overhang, emphasizing the nuanced and context-specific nature of these financial relationships.

Summary of Chinese listed firms

Over recent decades, capital structure decision-making has gained significant attention in theoretical and empirical studies, with a focus on mature markets like the U.S. and Canada. This paper shifts the lens to China, the world's second-largest economy, whose unique market characteristics stem from its blend of central planning and market economy. Analyzing data from 1047 Chinese listed firms (2000-2018), this study tests the pecking order model, explores capital structure determinants, and examines the impact of debt on future investments.

These results remain robust across various models and variable measurements. In testing the pecking order theory, the study finds that Chinese firms prioritize short-term debt over long-term borrowing, challenging traditional pecking order hierarchy.

Additionally, profitability emerges as a key determinant of capital structure, indicating a preference for retained profits over other financing forms. The study also examines the impacts of asymmetric information, tangibility, growth ratio, tax, and financial deficits on capital structure. Notably, the influence of asymmetric information is ambiguous, particularly for larger firms, and the impact of tangibility varies across sectors. Contrary to trade-off theory, tax benefits and debt relationships are challenged, highlighting the variable significance of financial deficits based on debt type. Regarding the influence of debt on future investments, the paper finds a negative correlation between short-term debt and future investments in manufacturing firms, diverging from the predictions of Myers (1977) and aligning more with Diamond and He's (2014) perspectives.

This research serves as a foundational exploration into the dynamics of debt overhang and future investments in Chinese companies. As the Chinese market evolves, further study on intangible assets and the interplay between future investments and equity ownership in Chinese firms becomes increasingly relevant, given the less pronounced impact of leverage in these contexts.

Summary of North-American listed firms

This chapter significantly enhances our understanding of the interplay between future investment expectations and capital structure decisions. It demonstrates, through cross-sectional analysis, a negative influence of future investments on short-term debt, aligning with Diamond and He's (2012) findings. Conversely, it establishes a positive correlation between long-term debt and expected investment levels, supporting Zhang's (2022) assertions and the pecking order theory. The study also reveals that high-growth firms show less susceptibility in their debt issuance to future investment levels compared to mature firms. Additionally, it echoes Lemon (2008) and Akhtar (2012) in identifying the role of time-invariant factors in capital structure decisions.

The research highlights the varying impacts of business cycles on debt types: short-

term debt is a preferred financing method during expansion, whereas long-term debt's influence grows in recession periods. The paper suggests future research to delve into industry heterogeneity, time passage impacts, and regional differences, proposing the use of techniques like the EWMA model or segmenting the study period into distinct phases for more nuanced insights.

Summary of Global Listed firms

This paper thoroughly explores the complex interplay between liquidity, expected investment, and debt overhang, focusing on both U.S.-listed and global firms. Our investigation sheds light on the nuanced ways these financial elements interact, significantly influencing corporate behavior and strategic decision-making processes. Initially, the paper sets the stage by emphasizing the criticality of understanding debt overhang — a scenario where existing debt hinders new investments — and its impact on corporate strategy, particularly in times of economic downturns.

The research employs a novel methodology, constructing a q-factor based on various liquidity indicators, to evaluate its effect on both long-term and short-term debt overhang scenarios. Through meticulous data analysis, we uncover substantial correlations between liquidity, firm size, profitability, growth rates, and debt overhang. The data pool for this study is sourced from CompStat North America Annual Fundamental items and Global Fundamental Annuals, offering a rich, comprehensive dataset. This dataset encompasses diverse financial, market, and statistical information about firms across North America and the globe, covering a substantial period from 1988 to 2022.

Diving deeper, the empirical findings for U.S.-listed firms reveal that three pivotal factors — current ratio, operating cash flow, and net working capital — exhibit a positive correlation with future investments. A robust current ratio, indicating a healthy level of liquid assets, is instrumental in empowering a firm to fund new initiatives and manage potential risks, with its significance amplified over the long haul. The operating cash flow, a marker of effective revenue generation, plays a key

role in internally funding investments and strategic undertakings. Similarly, net working capital, essential for both short-term operations and long-term investments, enhances operational efficacy and financial stability, thereby bolstering a firm's capacity for investment. These factors collectively enhance a firm's agility in capitalizing on investment opportunities, especially in dynamic market conditions.

Conversely, the study's findings for non-U.S. listed firms indicate that, in the short term, heightened liquidity prompts firms to prioritize cash assets for enhanced flexibility and rapid market response, often at the expense of short-term investments. However, in the long term, strong liquidity acts as a beacon of financial health and accessibility to funds, thereby encouraging comprehensive strategic planning and financing of larger-scale projects. High liquidity levels also improve a firm's creditworthiness, simplifying the process of securing financing under more favorable conditions. As a result, while excessive liquidity may dampen short-term investments, it plays a pivotal role in supporting and enabling long-term investment strategies.

For U.S. firms, our findings indicate that most variables, except for profitability, show a significant correlation with debt overhang. The Expected Investment Level (EI) and firm growth exert a negative influence on debt overhang, whereas firm size has a positive impact. A high EI implies self-financing capabilities, thereby reducing reliance on debt and mitigating overhang risks. Larger firms, with their enhanced borrowing capacity, are more susceptible to debt overhang. Conversely, firm growth diminishes the risk of overhang by bolstering internal cash flows and enhancing creditworthiness. The weak correlation between profitability and total debt overhang could stem from existing high debt levels and market perceptions. In short-term contexts, profitability and growth play a role in reducing debt overhang, while firm size contributes to its increase. However, EI does not demonstrate a significant short-term impact. Long-term analysis reflects similar patterns, with firm size contributing to debt overhang, while profitability and EI work to reduce it. This study accentuates the varying influences of different factors on debt overhang, underscoring the complexity of financial management across different time frames. In contrast, non-U.S. firms exhibit no substantial link between total debt overhang and expected investment,

which can be attributed to unique firm-specific characteristics, market perceptions, and possibly non-linear debt-investment dynamics. U.S. firms, operating in a stable economic environment with stringent regulations, demonstrate a more pronounced impact of debt on investment decisions compared to their global counterparts, which operate in more diverse economic and regulatory landscapes. The study also finds that size and growth positively influence short-term debt overhang in global firms, while profitability tends to have a negative effect. However, for long-term debt overhang, there is no significant relationship with expected investment, possibly due to the diversified operations and international exposure of these firms. Size and growth maintain a positive correlation with long-term debt overhang, but profitability negatively impacts it

While this research is extensive, it acknowledges certain limitations, primarily its focus on specific groups of firms and defined timeframes. Future studies could broaden the scope to include a more diverse array of firms and longitudinal analyses, capturing evolving economic trends over longer periods. Additionally, integrating qualitative methods could provide a deeper understanding of the decision-making processes within firms, complementing the quantitative data.

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Appendix

Chapter 2 Appendix

Appendix A. Correlation Analysis

A1. Correlation Analysis of pecking order test

The table provides the correlations among the independent variables. Panel A presents the full sample. Panel B is for I&T sample. Panel C represents Non-IT samples

Panel A All	Gross debt	Long debt	Long borrow	Bond	Dividend	Net invest	cashflow	Δwcr
Gross debt	1	*						
Long debt	0.447*	1	*					
Long-borrow	0.381*	0.817*	1					
bond	0.127*	0.416*	0.106*	1			-	
dividend	0.023*	0.041*	0.095*	0.042*	1			
Net invest	-0.158*	0.011	0.044*	0.010	0.052*	1		
Cashflow	-0.149*	-0.148*	-0.152*	-0.058*	0.237*	0.195*	1	
Δwcr	-0.063*	-0.047*	-0.004	-0.019*	-0.054*	-0.005	0.011	1

Panel B I&T	Gross debt	Long debt	Long borrow	Bond	Dividend	Net invest	Cashflow	Δwcr
Gross debt	1							
Long debt	0.419*	1						
Long-borrow	0.305*	0.738*	1					

bond	0.117*	0.403*	0.077*	1				
dividend	-0.018	-0.014	0.041*	-0.002	1			
Net invest	-0.118*	0.099*	0.125*	0.038*	0.002	1		-
Cashflow	-0.078*	0.004	-0.008	-0.004	0.249*	0.211*	1	
Δwcr	-0.042*	-0.075*	-0.035*	-0.056*	-0.057*	-0.046*	0.108*	1

Panel C N-IT	Gross debt	Long debt	Long borrow	Bond	Dividend	Net invest	cashflow	Δwcr
	1						-	
Long debt	0.435*							
Long-borrow	0.374*	0.822*	1					
bond	0.120*	0.415*	0.102*	1				
dividend	0.020*	0.044*	0.098*	0.048*	1			
Net invest	-0.154*	0.007	0.045*	0.010	0.071*	1		
Cashflow	-0.156*	-0.169*	-0.169*	-0.064*	0.237*	0.188*	1	
Δwcr	-0.043*	-0.025*	0.021*	-0.005	-0.047*	-0.001	-0.028*	1

A2. Correlation Analysis of leverage regression test

	logta	amihud	tangi	itangi	sale	profit	deficit	tax	tobinq
Panel A									
logta	1								
amihud	-0.249*	1					-		-
tangi	-0.139*	0.054*	1						
itangi	-0.086*	-0.029*	0.169*	1					
sale	0.037*	0.021*	0.103*	0.013	1				
profit	0.121*	-	-	-	0.153*	1			

		0.133*	0.130*	0.090*					
deficit	0.067*	-0.055*	-0.106*	-0.083*	-0.049*	0.165*	1		
tax	0.129*	-0.026*	-0.034*	-0.033*	0.085*	0.116*	-0.001	1	
tobinq	-0.383*	0.065*	-0.063*	0.046*	-0.072*	-0.005	-0.025*	-0.155*	1

	logta	amihud	tangi	itangi	sale	profit	dr	tax	tobinq
Panel B									
logta	1								
amihud	-0.244*	1							
tangi	-0.015	0.008	1						
itangi	-0.040*	0.017	0.136*	1	-				
sale	-0.073*	0.038*	-0.064*	-0.063*	1				
profit	-0.026	0.010	-0.198*	-0.129*	0.205*	1			
dr	-0.013	0.034	0.003	-0.049*	0.062*	0.110*	1		
tax	-0.008	-0.002	0.094*	-0.016	0.005	0.055*	-0.015	1	-
tobinq	-0.159*	0.125*	-0.063*	0.013	-0.128*	-0.061*	-0.033	-0.071*	1

	logta	amihud	tangi	itangi	sale	profit	dr	tax	tobinq
Panel C									
logta	1	*							
amihud	-0.259*	1							
tangi	-0.190*	0.053*	1						

itangi	-0.100*	-0.037*	0.168*	1					
sale	0.032*	0.015*	0.101*	0.017*	1				
profit	0.159*	-0.156*	-0.110*	-0.081*	0.156*	1			
dr	0.112*	-0.076*	-0.114*	-0.090*	-0.061*	0.179*	1		
tax	0.124*	-0.035*	-0.078*	-0.042*	0.078*	0.138*	0.022*	1	
tobinq	-0.414*	0.062*	-0.026*	0.064*	-0.047*	-0.005	-0.050*	-0.147*	1

A3. Correlation Analysis of debt overhang test

	capex	cfr	lldr	lclr	ltobinq	lsale
Panel C						
capex	1					
cfr	0.185*	1				
lldr	-0.052*	-0.107*	1			
lclr	-0.208*	-0.082*	0.057*	1	-	
ltobinq	0.109*	-0.040*	-0.078*	-0.087*	1	*
lsale	0.016*	0.214*	-0.214*	0.246*	-0.130*	1

	capex	cfr	lldr	lclr	ltobinq	lsale
Panel B						
capex	1					
cfr	0.208*	1	-	-		
lldr	-0.021	0.011	1			
lclr	-0.132*	-0.067*	0.121*	1		
ltobinq	0.140*	-0.128*	0.021	-0.088*	1	
lsale	0.018	0.224*	-0.151*	0.335*	-0.253*	1

	capex	cfr	lldr	lclr	ltobinq	lsale
Panel C						
capex	1					
cfr	0.170*	1				
lldr	-0.045*	-0.118*	1			
lclr	-0.215*	-0.072*	0.023*	1		
ltobinq	0.083*	-0.025*	-0.082*	-0.063*	1	
lsale	0.025*	0.224*	-0.236*	0.225*	-0.100*	1

Appendix B. Robustness Check

B1. Leverage regression analysis of gross debt (with illiquidity ratio)

The table provides the results of impact of asymmetric information to the gross debt level for all firms. It is apparent that there is no relationship between the illiquidity ratio and gross debt level.

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt
tangi	0.016	0.014	0.259***	0.261***	-0.014	-0.028
	(0.51)	(0.48)	(3.35)	(3.50)	(-0.41)	(-0.92)
itangi	-0.084	-0.127	0.055	0.034	-0.110	-0.159
	(-0.88)	(-1.40)	(0.26)	(0.17)	(-1.05)	(-1.59)
amihud	0.003	0.004	0.006	0.006	0.002	0.004
	(0.64)	(0.88)	(0.62)	(0.62)	(0.32)	(0.65)
profit	-0.751***	-0.798***	-0.403***	-0.458***	-0.832***	-0.873***
	(-17.23)	(-18.76)	(-4.03)	(-4.63)	(-17.68)	(-19.11)
tax	0.001	0.013	-0.065*	-0.054	0.006	0.015
	(0.06)	(1.18)	(-1.73)	(-1.45)	(0.48)	(1.23)
tobinq	-0.008***	-0.009***	-0.002	-0.003	-0.010***	-0.011***
	(-3.85)	(-4.37)	(-0.77)	(-1.07)	(-3.63)	(-3.87)
deficits	0.013***	0.011***	-0.001	-0.001	0.019***	0.017***

	(2.92)	(2.64)	(-0.15)	(-0.08)	(3.30)	(3.11)
Constant	0.521***	0.498***	0.353***	0.340***	0.551***	0.535***
	(55.21)	(47.51)	(23.37)	(19.86)	(50.07)	(44.95)
Observations	14,283	14,283	2,012	2,012	12,271	12,271
R-squared	0.116		0.087		0.132	
Number of code	1,039	1,039	201	201	838	838
F test	0	0	8.13e-07	1.83e-10	0	0
r2_a	0.116	.	0.0836	.	0.132	.
F	58.32	.	6.412	.	60.95	.
Hausman test	323.41(0.00)		47.12(0.00)		201.78(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1, t-Statistics are provided in Parenthesis below the coefficients estimates.

B2. Leverage regression analysis of long debt (with illiquidity ratio)

The table provides the results of impact of asymmetric information to the long-term debt level for all firms. The results show a positive and significant influence of asymmetric information on long-term debt for Non-IT firms, which is the opposite of the results of sales.

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Long debt	Long debt	Long debt	Long debt	Long debt	Long debt

tangi	-0.043***	-0.032**	0.064*	0.103***	-0.054***	-0.050***
	(-2.59)	(-2.20)	(1.73)	(3.05)	(-3.02)	(-3.18)
itangi	0.027	0.015	-0.038	-0.003	0.030	0.013
	(0.56)	(0.34)	(-0.34)	(-0.03)	(0.55)	(0.26)
amihud	-0.012***	-0.011***	-0.003	-0.003	-0.014***	-0.013***
	(-5.97)	(-6.08)	(-0.82)	(-0.93)	(-5.73)	(-5.75)
profit	-0.152***	-0.165***	-0.114***	-0.122***	-0.157***	-0.170***
	(-7.41)	(-8.34)	(-3.29)	(-3.65)	(-6.63)	(-7.39)
tax	0.021***	0.025***	-0.029**	-0.026**	0.024***	0.027***
	(3.57)	(4.43)	(-2.44)	(-2.16)	(3.86)	(4.34)
tobinq	-0.002***	-0.003***	0.002*	0.001	-0.004***	-0.004***
	(-3.27)	(-3.99)	(1.77)	(1.40)	(-4.48)	(-4.79)
deficits	0.000	0.000	-0.002	-0.003	0.001	0.001
	(0.09)	(0.11)	(-0.95)	(-1.16)	(0.32)	(0.57)
Constant	0.091***	0.085***	0.039***	0.032***	0.102***	0.098***
	(20.91)	(18.54)	(6.61)	(5.98)	(19.97)	(18.30)
Observations	14,283	14,283	2,012	2,012	12,271	12,271
R-squared	0.030		0.048		0.037	
Number of code	1,039	1,039	201	201	838	838
F test	0	0	0.00725	6.60e-05	0	0

r2_a	0.0295	.	0.0445	.	0.0369	.
F	16.92	.	2.860	.	15.03	.
Hausman test	112.531(0.00)		26.637(0.00)		69.94(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

B3. Leverage regression analysis of gross debt (with log of total assets)

The table provides the results of impact of firm size to the gross debt level for all firms. Hausman test is using to examining the appropriateness of two alternative models. The results indicated fixed effect model has more explanatory power. There is a negative and significant relationship between the firm size and gross debt level for I&T firms, which is opposite of results of sales. For Non-It firms, firms size appeared to be no influencing on gross debt level, which is also difference with the results of sales.

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt
tangi	0.106***	0.095***	0.286***	0.285***	0.082**	0.053*
	(3.50)	(3.62)	(4.16)	(4.36)	(2.52)	(1.88)
itangi	0.042	-0.027	0.046	0.046	0.025	-0.060
	(0.47)	(-0.33)	(0.27)	(0.30)	(0.25)	(-0.65)
logta	0.005	0.014*	-0.040**	-0.035**	0.014	0.020**

	(0.62)	(1.78)	(-2.51)	(-2.25)	(1.44)	(2.35)
profit	-0.423***	-0.503***	-0.240***	-0.303***	-0.481***	-0.566***
	(-9.21)	(-11.32)	(-2.79)	(-3.58)	(-9.04)	(-11.12)
tax	-0.018	-0.003	-0.075**	-0.059	-0.016	-0.004
	(-1.55)	(-0.22)	(-2.04)	(-1.64)	(-1.28)	(-0.37)
tobinq	-0.019***	-0.020***	-0.009***	-0.010***	-0.022***	-0.022***
	(-10.04)	(-9.82)	(-4.16)	(-4.27)	(-8.40)	(-7.98)
Deficits	0.009**	0.007*	-0.001	-0.001	0.014**	0.011**
	(2.39)	(1.75)	(-0.18)	(-0.17)	(2.56)	(1.99)
Constant	0.468***	0.382***	0.741***	0.697***	0.418***	0.359***
	(5.70)	(5.13)	(4.86)	(4.60)	(4.62)	(4.41)
Observations	16,401	16,401	2,678	2,678	13,723	13,723
R-squared	0.081		0.095		0.093	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0	0	0	0
r2_a	0.0803	.	0.0930	.	0.0923	.
F	44.10	.	14.77	.	38.94	.
Hausman Test	559.83(0.00)		91.89(0.00)		477.44(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

B4. leverage regression analysis of long-term debt (with Log of total asset)

The table provides the results of impact of firm size to the long-term debt level for all firms. Hausman test is using to examining the appropriateness of two alternative models. The results indicated fixed effect model has more explanatory power. There is a positive and significant relationship between firm size and long-term debt level, which is opposite to the results of sales.

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Long debt	Long debt	Long debt	Long debt	Long debt	Long debt
tangi	0.023	0.024**	0.080**	0.112***	0.019	0.014
	(1.65)	(2.05)	(2.37)	(3.76)	(1.29)	(1.11)
itangi	0.025	0.020	-0.067	-0.008	0.032	0.022
	(0.61)	(0.53)	(-0.72)	(-0.10)	(0.71)	(0.52)
logta	0.040***	0.039***	0.003	0.005	0.047***	0.046***
	(11.39)	(12.60)	(0.43)	(0.82)	(12.41)	(13.32)
profit	-0.071***	-0.091***	-0.103***	-0.112***	-0.067***	-0.091***
	(-4.06)	(-5.39)	(-3.38)	(-3.74)	(-3.30)	(-4.61)
tax	0.012**	0.014***	-0.032***	-0.029**	0.014**	0.016***
	(2.18)	(2.72)	(-2.67)	(-2.44)	(2.45)	(2.81)
tobinq	-0.003***	-0.003***	0.000	0.000	-0.003***	-0.003***
	(-3.93)	(-3.88)	(0.48)	(0.29)	(-3.69)	(-3.41)
deficits	-0.001	-0.001	-0.002	-0.002	-0.002	-0.001

	(-0.85)	(-0.71)	(-0.81)	(-1.07)	(-0.94)	(-0.69)
Constant	-0.298***	-0.299***	0.019	-0.005	-0.370***	-0.358***
	(-9.07)	(-10.36)	(0.34)	(-0.10)	(-10.16)	(-11.10)
Observations	16,401	16,401	2,678	2,678	13,723	13,723
R-squared	0.070		0.044		0.090	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0.00101	3.25e-06	0	0
r2_a	0.0697	.	0.0412	.	0.0894	.
F	30.10	.	3.639	.	31.18	.
Hausman Test	104.35(0.00)		28.73(0.00)		104.9(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

	All Firms		IT Firms		Non-IT Firms	
	Fixed	Random	Fixed	Random	Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Net invest	Net invest	Net invest	Net invest	Net invest	Net invest
Cashflow	0.153***	0.175***	0.218***	0.260***	0.136***	0.151***
	(6.12)	(7.32)	(3.04)	(3.94)	(5.28)	(6.15)
Short..Debt	-0.193***	-0.207***	-0.035	-0.088*	-0.224***	-0.227***
	(-9.38)	(-11.87)	(-0.62)	(-1.82)	(-10.29)	(-12.17)
TobinQ	0.013***	0.012***	0.019***	0.019***	0.010***	0.010***
	(7.11)	(7.10)	(5.35)	(5.05)	(5.07)	(5.31)
Sale	0.005	0.010	0.004	0.013	0.004	0.010
	(0.63)	(1.58)	(0.14)	(0.49)	(0.44)	(1.63)
Constant	0.153***	0.159***	0.100***	0.118***	0.170***	0.169***
	(12.91)	(14.50)	(3.48)	(4.26)	(13.36)	(14.23)
Observations	15,359	15,359	2,470	2,470	12,889	12,889
R-squared	0.040		0.041		0.045	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	1.60e-07	1.63e-09	0	0
r2_a	0.0400	.	0.0394	.	0.0447	.
F	50.54	.	10.15	.	44.07	.

Hausman test	32.42(0.00)	19.148(0.00)	20.36(0.00)

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

B6. Long-term debt overhang test (with net investment ratio)

This table provide the relationship between long-term debt and future investments, with the dependent variables of net investment ratio. Hausman test is using to examining the appropriateness of two alternative models. The results indicated fixed effect model has more explanatory power. Capital expenditure appears to be negatively affected by long-term debt, but not significant. After deduct deprecation and amortization expenses, the impact of long-term debt on investment become significantly negative.

	All Firms		IT Firms		Non-IT	
	Fixed	Random	Fixed	Random	Firms Fixed	Random
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Net Invest	Net Invest	Net Invest	Net Invest	Net Invest	Net Invest
Cashflow	0.143***	0.176***	0.222***	0.265***	0.125***	0.154***
	(5.65)	(7.34)	(3.10)	(4.02)	(4.78)	(6.20)
Long.Debt	-0.036	-0.055*	-0.215**	-0.210**	-0.021	-0.034
	(-1.08)	(-1.76)	(-2.24)	(-2.36)	(-0.57)	(-1.04)
TobinQ	0.015***	0.014***	0.019***	0.019***	0.013***	0.012***
	(8.13)	(7.94)	(5.51)	(5.19)	(6.39)	(6.31)
Sale	-0.013	-0.011	-0.004	-0.004	-0.015*	-0.010
	(-1.58)	(-1.55)	(-0.13)	(-0.14)	(-1.76)	(-1.40)
Constant	0.086***	0.091***	0.101***	0.106***	0.085***	0.086***
	(10.07)	(11.51)	(4.57)	(4.74)	(9.13)	(10.39)
Observations	15,359	15,359	2,470	2,470	12,889	12,889
R-squared	0.022		0.043		0.018	
Number of code	1,047	1,047	208	208	839	839

F test	0	0	4.15e-07	6.53e-08	0	0
r2_a	0.0222	.	0.0417	.	0.0172	.
F	23.60	.	9.555	.	15.80	.
Hausman test	70.57(0.00)		20.532(0.00)		48.437(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

B7. Leverage regression analysis of long-term debt (with ROA)

The table provides the results of impact of return on assets (ROA) to the long-term debt level for all firms. Hausman test is using to examining the appropriateness of two alternative models. The results indicated fixed effect model has more explanatory power. Overall, there is a significant and negative relationship between long-term debt and ROA; However, the IT firms' long-term debt level is not affected by ROA.

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Long debt	Long debt	Long debt	Long debt	Long debt	Long debt
tangi	-0.014	-0.003	0.083**	0.116***	-0.029*	-0.024*
	(-0.96)	(-0.22)	(2.42)	(3.84)	(-1.84)	(-1.73)
itangi	0.057	0.044	-0.065	-0.001	0.077	0.052
	(1.29)	(1.06)	(-0.70)	(-0.01)	(1.54)	(1.12)

sale	-0.032***	-0.032***	-0.012	-0.015**	-0.035***	-0.035***
	(-9.52)	(-11.44)	(-1.39)	(-1.97)	(-9.82)	(-11.88)
roa	-0.042***	-0.059***	-0.034	-0.042	-0.048***	-0.063***
	(-2.74)	(-4.05)	(-1.14)	(-1.44)	(-2.71)	(-3.75)
tax	0.018***	0.023***	-0.037***	-0.034***	0.022***	0.026***
	(3.04)	(3.99)	(-2.84)	(-2.61)	(3.57)	(4.14)
tobinq	-0.004***	-0.004***	0.001	0.001	-0.005***	-0.005***
	(-5.18)	(-5.43)	(0.80)	(0.57)	(-5.85)	(-5.80)
deficits	-0.001	-0.002	-0.003	-0.003	-0.001	-0.001
	(-0.85)	(-1.08)	(-1.25)	(-1.52)	(-0.62)	(-0.62)
Constant	0.100***	0.096***	0.045***	0.041***	0.113***	0.111***
	(22.42)	(20.31)	(6.17)	(5.62)	(21.96)	(20.46)
Observations	16,401	16,401	2,678	2,678	13,723	13,723
R-squared	0.029		0.031		0.039	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0.0660	0.000730	0	0
r2_a	0.0290	.	0.0288	.	0.0382	.
F	18.54	.	1.933	.	20.59	.
Hausman test	142.58(0.00)		33.05(0.00)		93.55(0.00)	

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

B8. Leverage regression analysis of gross debt (with ROA)

The table provides the results of impact of return on assets (ROA) to the gross debt level for all firms. From the results, it can be concluded that roa can significantly impact the gross debt level for both industries; this furthers demonstrates that debt structure of Chinese companies is dominated by short-term debt

	All Firms		IT Firms		Non-IT	
	(1)	(2)	(3)	(4)	(5)	(6)
	Fixed	Random	Fixed	Random	Fixed	Random
VARIABLES	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt	Gross debt
tangi	0.088***	0.072**	0.291***	0.295***	0.053	0.024
	(2.80)	(2.54)	(4.36)	(4.50)	(1.57)	(0.81)
itangi	0.063	0.013	0.098	0.096	0.055	-0.009
	(0.70)	(0.15)	(0.58)	(0.62)	(0.55)	(-0.10)
sale	0.076***	0.075***	0.136***	0.137***	0.069***	0.067***
	(9.66)	(10.98)	(8.51)	(9.00)	(8.15)	(9.27)
roa	-0.418***	-0.484***	-0.146**	-0.185***	-0.519***	-0.584***
	(-11.42)	(-13.56)	(-2.16)	(-2.72)	(-12.33)	(-14.41)
tax	-0.025**	-0.014	-0.096**	-0.087**	-0.019	-0.011
	(-2.02)	(-1.13)	(-2.42)	(-2.18)	(-1.46)	(-0.90)
tobinq	-0.016***	-0.016***	-0.004	-0.004	-0.020***	-0.019***
	(-7.63)	(-7.50)	(-1.53)	(-1.54)	(-6.94)	(-6.68)
deficits	0.007	0.005	-0.005	-0.006	0.013**	0.010*
	(1.62)	(1.11)	(-0.95)	(-1.03)	(2.26)	(1.80)
Constant	0.457***	0.451***	0.275***	0.269***	0.496***	0.496***
	(41.79)	(39.13)	(14.71)	(13.78)	(40.07)	(38.76)
Observations	16,401	16,401	2,678	2,678	13,723	13,723
R-squared	0.088		0.149		0.096	
Number of code	1,047	1,047	208	208	839	839
F test	0	0	0	0	0	0
r2_a	0.0880	.	0.147	.	0.0960	.

F	48.82	.	24.77	.	43.08	.
Hausman test	429.82(0.00)		51.72(0.00)		337.74(0.00)	

Robust t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1. t-Statistics are provided in Parenthesis below the coefficients estimates.

Appendix C: Key variable definition

Gross debt= book value of total debt/ book value of total asset

Long-term debt= book value of long-term debt/ book value of total assets

Current debt= Short-term debt/ book value of total assets

Long-term borrowing= long-term borrowing/ book value of total assets

Tangi= fixed assets / book value of total assets

Itangi= intangible assets/ book value of total assets

Logta = logarithm of book value of total assets

Sale= sale revenue/ book value of total assets

Profitability= operating profit / book value of total assets

Roa= net profit/ book value of total assets

Effective tax rate= income tax expense/ EBI

Capex =capital expenditure/ lagged book value of total assets

Net invest= (capital expenditure-depreciation)/ lagged book value of total assets

Sales (debt overhang)= Sales revenue/ lagged book value of total assets

Cashflow (debt overhang) = Free cash flow/ lagged book value of total assets

Cfr (correlation) = cash flow

Lldr (correlation) = lagged long-term debt

Llcr (correlation) = lagged short-term debt

Ltobinq (correlation)= lagged tobin's Q

Lsale (correlation) = lagged sale.

Δwcr= change in working capital

Chapter3. Appendix

A. Variables Definition

Items	Construction
Tobin's Q	(total asset-total equity+market equity)/total asset
Cash flow (FCFF)	Net income+Interest expense+depreciation-fixed investment-Working capital
ROE	Net income/book value of equity
T.debt (total debt)	Total debt/total Asset
Short-term debt	Notes payable/total asset
Long-term debt	Long-term borrowings/total asset
Profitability	Operating cashflow (EBIT)
size	Sales turnover (Sale/ total asset)

B. Robustness check-predictor of expected investment factor

Variables	E(I/A) lag1	E(I/A) lag3
Tobin's Q	-0.004	0.002
	(0.00)	(0.46)
FCFE	0.0062	0.002
	(0.00)	(0.021)
ROCE	0.0053	0.004
	(0.01)	(0.03)
R-square	0.03	0.0212
F-Test	33.14	2.54

To assess the reliability of the predictor for expected cash flow, we utilize Free Cash Flow to Equity (FCFE) and Return on Capital Employed (ROCE) in place of Free Cash Flow to the Firm (FCFF) and Return on Equity (ROE). The outcomes obtained using FCFE and ROCE are both significant and consistent with those derived from FCFF and ROE. Consequently, this consistency supports the conclusion that cash flow and profit indicators are reliable predictors of the expected investment factor.

C. Robustness check-economic cycle effects

Expansion period

Variables	Short-term debt	Long-term debt	Total debt
EI	0.0496	0.0141	0.014
	(0.00)	(0.00)	(0.00)
profit	-0.113	-0.021	-0.184
	(0.00)	(0.00)	(0.00)
MB	-0.006	-0.0027	-0.003
	(0.01)	(0.00)	(0.02)
Size	0.056	-0.0057	-0.031
	(0.00)	(0.03)	(0.011)
R-square	6.6%	7.4%	1.13%
Wild-Chi	241	231	403
Prob > chi2	0.00	0.00	0.00

The table provides the panel fixed effects results of leverage on expected investment level on North American listed firms during expansion cycle by using three dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates. P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables is the investment ratio lagged for 1 year. All the variables are scaled by the total assets. for expansion cycle, there are 3062 firms in sample; however, only 1809 firms in recession sample.

Recession period

Variables	Short-term debt	Long-term debt	Total debt
EI	-0.03	-0.021	-0.061
	(0.00)	(0.00)	(0.00)
profit	-0.07	0.036	-0.19
	(0.00)	(0.00)	(0.409)
MB	0.023	0.0104	0.023
	(0.00)	(0.00)	(0.00)
Size	-0.004	-0.005	-0.0034
	(0.11)	(0.00)	(0.02)
R-square	2.32%	1.72%	6.21%
Wild-Chi	113	76	316
Prob > chi2	0.00	0.00	0.00

The table provides the panel fixed effects results of leverage on expected investment level on North American listed firms during recession cycle by using three dimensions of leverage. The p-value are provided in parenthesis below the coefficient estimates. P-value of 0.01, 0.05 and 0.1 denote statistical significance at the 1%, 5%, and 10% levels, respectively. The dependent variables is the investment ratio lagged for 1 year. All the variables are scaled by the total assets. for expansion cycle, there are 3062 firms in sample; however, only 1809 firms in recession sample.

To evaluate the robustness of our results regarding the impact of economic cycles on debt overhang and expected investment factors, we employed the fixed effect model as an alternative to the random effect model. The consistency in outcomes across both models reinforces the reliability of our empirical findings on the influence of economic cycles. This approach ensures a more accurate understanding of the relationship between economic fluctuations and financial variables in our study.

Chapter4. Appendix

A. Variable definition

Items	Definition
Cratio	Current ratio= current asset/ current liability
Cash flow	Operating cash flow
Quick ratio (q-ratio)	Current asset (exclude inventory)/ current liability
WcR	Net working capital= current asset-current liability
IR	Investment ratio= (capital expenditure + research and development expense)/asset total
EI	Expected investment level
Size	Sales turnover
Grow	Tobin's q for U.S firms; change in EPS for Global firms
L1	Lag for 1 year (short-term)
L3	Lag for 3 year (long-term)

B. Robustness check

Quick ratio and investment ratio for North-America listed firms

variables	L1ir	L3ir
Quick ratio	0.052	.11
Cashflow	0.041	.339
WcR	0.075	.1865
P-value(q-ratio)	0.043	0.01
p-value(cash)	0..00	0.00
pvalue(WcR)	0.074	0.00
R-square	1.4%	4.5%

Quick ratio and investment ratio for global listed firms

variables	L1ir	L3ir
Quick ratio	-0.013	.031
Cashflow	-0.047	-.0025
WcR	-0.073	.00383
P-value(q-ratio)	0.00	0.02
p-value(cash)	0..008	0.00
pvalue(WcR)	0.000	0.00
R-square	1.2%	0.55%

To evaluate the effectiveness of liquidity ratios in predicting future investment levels, we substituted the quick ratio for the current ratio in our analysis. The results showed that the quick ratio's performance was not significantly different from that of the current ratio. Consequently, this suggests that liquidity ratios are reliable predictors of future investment levels, indicating their usefulness in financial analysis and planning.

C. Pearson Analysis

1. Capital expenditure and Liquidity Ratio

	capex	Current ratio	WCR	Cashflow
capex	1			
Current ratio	0.208	1	-	-
WCR	0.321	0.41	1	
Cashflow	0.332	0.47	0.121	1

This table provides the Pearson analysis results of the capital expenditure and liquidity ratios. As shown in table, none of correlation is higher than 0.7. Therefore, there is no Multicollinear problem.

2. Expected investment and total debt

	Debt	EI	profit	Size	grow
Debt	1				
EI	-0.103	1	-	-	
Profit	-0.26	0.31	1		
Size	0.17	0.07	0.121	1	
grow	0.13	-0.05	0.11	-0.16	1

This table provides the Pearson analysis results of the total debt and its dependent variables. As shown in table, none of correlation is higher than 0.7. Therefore, there is no Multicollinear problem.