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The Effect of Capital Structure on Firm Risk in Public Companies of China

An Empirical Investigation of the Trade-off Theory of Debt in the Machinery Industry

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Summary

Title: The Effect of Capital Structure on Firm Risk in Public Companies of China: An Empirical Investigation of the Trade-off Theory of Debt in the Machinery Industry.

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Five Keywords: Capital Structure; Firm Risk; Machinery Industry; China; Public Companies

Purpose: To investigate the impact of capital structure on firm risk within China's machinery industry, focusing on the trade-off theory and equity financing preferences.

Methodology: This study utilises a quantitative approach with a multiple linear regression model and statistical tests such as Pearson and Spearman correlation coefficients, and ANOVA, to analyse financial data from publicly listed machinery companies in China.

Theoretical Perspectives: The theoretical perspective of this study is grounded in the trade-off theory, while also integrating pecking order, agency and market timing theories to contextualise capital structure decisions within the machinery sector in China.

Empirical Foundation: The empirical foundation draws on financial data from 927 China's publicly traded machinery companies while analysing important ratios to research the equity financing preferences and risk in firms.

Conclusion: Our findings challenge some of the traditional theories and underscore the need for tailored financial strategies in the emerging Chinese machinery market, informing both corporate managers and policymakers.

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- Sofia Lundkvist Tsivouraki

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1. Introduction

1.1 Background

Capital structure decisions have an immense effect on a company's risk profile and overall financial health given that they determine how much debt and equity to use in relation to operations. These choices have an effect on the larger economic environments in which businesses operate in addition to being crucial for specific businesses. In the context of China's machinery industry, a sector that is essential to the country's economy and the global manufacturing ecosystem, this thesis investigates these vital financial approaches.

Since Modigliani and Miller's (1958) groundbreaking theories, which argued that a firm's financial structure has no bearing on its market value in a perfect market, the concept of capital structure has undergone significant development. The impact of real-world problems such as taxes, bankruptcy risks, and imperfect markets, on firm financing decisions has been the subject of much academic discussion, spurred by this concept. For instance, the Trade-Off Theory, which was initially proposed in 1973 by Kraus and Litzenberger, proposes firms weigh the tax advantages of debt financing against the expenses associated with possible financial difficulties. This delicate balance is particularly important in capital-intensive sectors such as the manufacturing of machinery, where large investments magnify the consequences of financial debt.

Furthermore, a different perspective is offered by the Pecking Order Theory, which was first presented by Myers (1984) and further developed by Myers and Majluf (1984). Considering the detrimental selection costs associated with new stock issuance, it proposes that companies give priority to internal financing and, when required, debt over new shares. Considering the skewed financing preferences towards debt in China's machinery sector due to the opaque financial environments and the predominance of state-owned banks, this hypothesis is especially pertinent in this context.

Insights from Jensen and Meckling (1976), who address the effects of agency costs on capital structure, and Baker and Wurgler (2002), who present the Market Timing Theory and propose that businesses take advantage of stock market trends to minimize their capital costs, round out these foundational theories. The extensive range of theoretical frameworks available aids in the analysis

of the intricate dynamics involved in capital structure decisions within the context of China's distinct regulatory frameworks and market settings, which include substantial state intervention and rapid economic shifts.

A complex network of interconnections between governmental regulations and market forces characterises China's machinery industry, which is central to the nation's economic strategy (Arestis, Karagiannis and Lee, 2021). Firms in this sector make strategic capital structure decisions that impact not just their short-term financial performance but also their risk profile, capacity for making investments, and ability to compete globally. These decisions might range from debt financing to capital accumulation.

This background serves as the foundation for examining the subtle applications of these capital structure theories in the context of the Chinese machinery industry. It offers a lens through which the relationship between firm risk and corporate finance decisions can be analysed in an environment characterised by notable economic and regulatory peculiarities. This investigation is crucial for both academic enrichment and the development of practical financial strategies that navigate the complexities of developing market economies in countries like China.

This research aims to provide a thorough understanding of how decisions about capital structure affect firm risk by fusing theoretical understanding with empirical data. It also aims to make strategic recommendations that could be advantageous to industry stakeholders, policymakers, and the academic community engaged in international financial and industrial planning.

1.2 Problem Discussion

Applying Western capital structures theories like Trade-Off and Pecking Order Theories to the Chinese machinery industry, poses special difficulties due to heavy government interventions. These theories, fall short on accounting for the Chinese market’s distinct characteristics, like government involvement altering financial strategies as well as market dynamics (Kraus and Litzenberger, 1973; Myers, 1984; Harris and Raviv, 1991).

The Chinese government has a significant impact on corporate financial policy due to its dual function as a regulator and participant in the market. Thus, the Trade-Off Theory, which weighs

the tax advantages of debt against bankruptcy risks, becomes more complex in China due to possible government bailouts reducing those risks. Likewise, the predominance of state-backed funding skews the Pecking Order Theory, which proposes a preference for internal financing over external due to an information asymmetry costs, making external debt more alluring as a result of governmental influences (Myers and Majluf, 1984). According to empirical research by Harris and Raviv (1991) among others, institutional and economic differences have a substantial impact on capital structure decisions, which vary greatly between sectors and regions. DeAngelo and Roll (2015) state that companies regularly adjust their debt and equity in response to changes in the external economic and regulatory changes in China's rapidly changing legal and economic landscape.

Traditional theories of capital structure need to be reevaluated in light of the complexity brought up by China's unique conditions (Zhang et al., 2024). To effectively navigate China's financial environment, authorities and specialists in the machinery industry must comprehend these dynamics. The impact of managerial decisions on firm outcomes can also be explained by incorporating agency theory insights, which address conflicts between managers and shareholders. This is especially true in China, where state interests may not coincide with maximizing shareholder value (Jensen, 1986; Eisenhardt, 1989).

1.3 Purpose and Research Question

This thesis' primary goal is to investigate the impact of capital structure decisions on corporate risk-taking in China's machinery industry, with a particular emphasis on the interaction between debt and equity in a market influenced by oversight and market imperfections. By applying fundamental theories to the intricacies of an emerging market, it challengers on theories like the Modigliani and Miller theorem, which contend that capital structure has no effect on firm value in perfect markets.

Our research question, *"How does capital structure affect corporate risk-taking behavior?"* aims to uncover the complex relationships between leverage decisions and risk behaviors. As stated by Qu et al. (2018), debt financing in China frequently reacts to information asymmetry. This study supports the Pecking Order Theory, which holds that companies prefer debt in order to abstain the

costs associated with adverse selection. Furthermore, Zou and Xiao's (2006) study on Chinese SMEs highlights how market inefficiencies and state policies can strongly influence capital structure decisions to deviate from traditional theories.

In this thesis, data from Chinese publicly listed machinery firms from 2018 to 2023—a time frame characterized by notable financial changes and government interventions—are quantitatively analyzed. It assesses how these companies weigh the dangers associated with debt against its advantages, such as tax advantages, in the face of shifting market and regulatory conditions. The purpose of the study is to improve knowledge of the role capital structure has on corporate risk-taking and will benefit stakeholders in the Chinese machinery industry.

1.4 Main Findings

Using data obtained from 2403 annual observations of listed companies, the study thoroughly investigated the relationship between capital structure and business risk in China's machinery industry from 2018 to 2023. It demonstrated the dual nature of leveraging methods by confirming that higher leverage is linked to increased risk. Leverage increases the risk of financial instability while making development prospects and tax benefits more accessible. Furthermore, in accordance to market timing theory, the results indicate that companies dynamically modify their capital structures in reaction to market conditions. This flexibility highlights how companies strategically manage their debt loads to maximize capital expenditures in a range of economic climates. The study also emphasized the important part made by government interventions. Higher leverage is encouraged by state-backed financing mechanisms, which can have positive short-term advantages but can increase long-term risks and a company's reliance on policy changes. The study examined how these elements interacted during the observed time using hierarchical regression models, providing a detailed knowledge of how capital structure affects firm risk in various regulatory and economic contexts. Theoretical and practical viewpoints on financial management in the industry are enhanced by this examination.

1.5 Contribution

By applying critical capital structure theories to China's machinery industry—a sector that has received little attention in the literature—this thesis makes a distinctive contribution to the body of information already in existence. This study provides new insights into the workings of the Trade-Off and Pecking Order theories in non-Western economies by integrating them within the framework of notable governmental involvement and market specificities that characterize China. It builds on the work of Modigliani and Miller (1958) and others by analyzing how firm financial strategies in an emerging market are impacted by regulatory frameworks and economic growth. Additionally, our thesis leverages contemporary data from from the year 2018 to 2023 and provide up-to-date analysis of capital structure dynamics among China's evolving economic landscape. This not only bridges a significant gap by contextualizing theoretical models in a practical setting but it also enhances our understanding of capital structure's impact on firm risk. Consequently, our thesis contributes to theoretical understanding while also assisting business leaders and policymakers in developing financial strategies that are better suited to the unique characteristics of the Chinese market.

1.6 Limitations

The relatively unexplored machinery sector in China and the study's emphasis on Chinese publicly listed firms have a number of constraints. The depth of theoretical and empirical research in this sector is impacted by the absence of thorough studies on capital structure dynamics. The level of government intervention or all facets of financial strategies may not be fully captured by using publicly available financial statements. The sample size has been lowered due to incomplete data and issues regarding transparency, which may have an impact on the reliability of the results. Results should not be extrapolated to other situations since emerging markets such as China lack a cohesive framework for examining capital structure. It is possible that China's distinct regulatory and economic landscape may not be applicable elsewhere. Understanding long-term company behavior may be limited if the research period does not reflect long-term trends or cyclical fluctuations. Further factors that could impact the dependability of the findings are possible biases, multicollinearity, and model specification errors in the econometric models. The study offers insightful information about the capital structure, corporate risk-taking, and firm value in China's

machinery industry, notwithstanding these drawbacks. By adding more variables, larger datasets, and longer time periods, future study may improve robustness.

2. Theoretical Background

2.1 Fixed Income Instruments & Capital Structure Theories

2.1.1 Conceptualization of Capital Structure

A company's operations and financial health are largely dependent on its capital structure, which is the combination of long-term debt, specific short-term debt, preferred equity, and common equity. It affects every aspect of the firm, including its risk profile and capacity to carry out new projects.

Modigliani and Miller's (1958) theorem asserts that in a perfect market, a firm's value is not influenced by its capital structure since there are no taxes, no costs associated with bankruptcy, and asymmetric information. Nevertheless, the actual state of affairs differs greatly from this theoretical framework, posing a number of challenges that require strategic financial management. According to Kraus and Litzenberger's (1973) Trade-Off Theory, firms balance the risks of possible financial distress against the tax shields associated with debt.

On the other hand, Myers (1984) presents the Pecking Order Theory, which contends that because new stock issues have negative selection costs, firms ought to prioritize debt and internal financing over equity. This perspective is particularly relevant for industries like China's machinery sector, where financial markets have notable transparency levels. Baker and Wurgler (2002) introduced the Market Timing Theory, which elaborates far more on the dynamics of market conditions.

Cross-country studies have added value to the examination of capital structure determinants by emphasizing the impact of various institutional frameworks and market conditions. Nivorozhkin (2004), in his analysis of the capital structures of EU accession nations, emphasizes how market conditions and the evolution of the financial system influence firm behavior, especially when there

are notable institutional and market imperfections (Bancel and Mittoo, 2004; Nguyen and Ramachandran, 2006).

The understanding of these theories is continuously updated by the larger literature. For instance, recent studies have reexamined the Pecking Order and Trade-Off theories, taking into account variables like market timing and how market cycles affect capital structure decisions (Jahanzeb et al., 2013; Li et al., 2018).

2.1.2 Trade-Off Theory

According to Kraus and Litzenberger's 1973 Trade-Off Theory of Capital Structure, firms should weigh the potential costs of financial crisis against the tax benefits of debt financing. As to the theory, there exists an ideal capital structure wherein the tax savings from debt are equivalent to the costs associated with financial distress.

According to Jahanzeb et al. (2013), the Trade-Off Theory asserts that the benefits of tax shields from debt can be substantial, making debt an attractive financing option for firms. They reiterate that leveraging increases firm value to a point, beyond which the costs associated with potential financial distress outweigh the benefits from interest tax shields. This dynamic is particularly pertinent in the machinery sector in China where firms are often incentivized to leverage heavily due to tax benefits and implicit government backing, which may decrease perceived bankruptcy risks (Jahanzeb et al., 2013).

Regulations from the government have significant effects on the costs and benefits of firm financing decisions in China's machinery sector. State-backed companies can function with higher leverage ratios and benefit from broader financial distress thresholds when there are implicit government guarantees established (Hao and Lu, 2014). However, this increasing leverage amplifies the risks associated with the system, especially when changes in macroeconomic policies result in stiffer lending requirements, which could place these firms' finances in severe jeopardy (Campbell and Kelly, 1994). It is essential for industry managers to maintain a balanced approach to capital structure management in light of these challenges. The requirement for a dynamic debt management strategy is emphasized by the findings from both empirical research and the theoretical framework developed by Brealey, Myers, and Allen (2010).

In order to achieve growth, managers in this industry must balance the risks associated with taking on excessive debt with prudent use of leverage. The ideal leverage ratio is dynamic and needs to be continuously modified as market conditions and fiscal policies change. The insights provided by Jahanzeb et al. (2013) emphasize how crucial it is to keep capital structure flexible in order to respond to opportunities and demands from the outside world.

The machinery sector is dynamic, fueled by rapid technological advances and changing regulatory landscapes. Therefore, it calls for a more flexible and proactive approach to debt management than what the static trade-off theory proposes, which advocates for a one-time optimization of debt levels. In order to maximize the trade-off between tax shields and the cost of financial distress, companies should periodically reevaluate their debt levels (Jahanzeb et al., 2013; Li et al., 2018).

2.1.3 Pecking Order Theory

Myers (1984) first proposed the Pecking Order Theory which posits that firms should prioritize internal funding and turn to debt when internal resources are no longer adequate. According to He, Xu, and Yang (2020), the opaque and asymmetric information financial markets in China make this funding hierarchy more pertinent. For instance, Chinese equipment companies frequently rely on retained earnings in addition to state assistance state, which is in line with their strategic objectives to keep costs under control and reduce equity dilution (Myers and Majluf, 1984).

The combined function of the Chinese state as a significant financier and a regulatory body impacts the actual application of the Pecking Order Theory (Li, Yang, and Zhao, 2019). The tendency of the state to choose debt over equity when financing state-owned firms is consistent with its broader industrial policy objectives, which in turn impacts macroeconomic capital structure choices. In order to take advantage of tax shields and reduce external scrutiny and shareholder disputes, large-scale investments in the sector frequently use debt financing.

Applying the theory to the under-explored perspective of analyzing how loan maturity preferences change at different periods of a firm's life cycle, Zhang and Xu's (2021) findings are incorporated. According to their research, companies in their growth stages have a high long-term debt ratio because of the general state of the economy and government initiatives like the Mass

Entrepreneurship and Innovation campaign, which have greatly influenced financing behaviors since the 2008 financial crisis. The implementation of the 'new normal' economic strategy emphasizes the dynamic characteristics of Pecking Order Theory within China's changing economic landscape. Due to strategy changes and regulatory-imposed liquidity constraints, this policy shift has resulted in structural changes in corporate finance, with companies depending more and more on short-term debt throughout early and recessionary life cycle stages (Zhang and Xu, 2021)[1].

Furthermore, that connection between debt structures and firm life cycle stages implies that companies should adjust the maturity of their loan in accordance with stage-specific financial requirements and outside economic circumstances. To handle the increased risks and uncertainties that come with these stages, for instance, firms in the introduction and recession phases often need shorter-term financing. On the other hand, growth-stage companies may choose to put on longer-term debt in order to finance their continual growth efforts because they benefit from the relative stability of the market as well as predictable cash flows.

2.1.4 Market Timing Theory

In 2002, Baker and Wurgler introduced the Market Timing Theory, a reexamination of the capital structure theories of Modigliani and Miller. According to this theory, firms should use transient market inefficiencies to their advantage by issuing equity at high market values and repurchasing shares at low valuations. This approach implies that savvy managers may respond to market changes to reduce capital costs and increase shareholder value.

Two strategies are highlighted by this theory. Firstly, Investor Irrationality and Mispricing, which takes advantage of market mispricings to time equity transactions and secondly, the Dynamic Adverse Selection Costs, which favors equity over debt when adverse selection costs are low, as demonstrated by empirical research (Korajczyk, Lucas, and McDonald, 1991; Almeida, Campello,

[1] Zhang, Y., & Xu, X. (2021). "Loan Maturity Preferences in Different Life Cycle Stages: Evidence from Chinese Firms." Asian Economic Papers, 20(3), 103-126.

and Weisbach, 2004). Studies also validate this strategy, which shows firms issue more equity when their shares are valued highly.

2.1.5 Financial Distress and Bankruptcy Costs

In a high-leverage environment such as China's machinery sector, it is imperative for companies to comprehend the expenses linked to the financial crisis and bankruptcy (White, 2009). According to Li et al. (2018), the Chinese government aims to avoid reductions in employment and regional economic downturns, which are among the larger economic effects of bankruptcy in addition to the immediate costs like legal and administrative fees.

Repercussions on stock prices, a damaged reputation overall, and a decline in supplier and customer confidence are examples of indirect costs. According to He, Xu, and Yang (2018), determining the best capital structures is a dynamic and intricate process that necessitates regular reevaluation in light of changing regulatory environments and market conditions. These considerations must be carefully weighed against the tax benefits of extensive leverage.

Baker and Wurgler (2002) contend that there might be notable departures from conventional capital structure theories due to the flexibility of capital structure, which is impacted by investor behavior and market conditions. The market timing theory highlights the importance of managerial discretion in the development of financial strategies and offers a convincing framework for comprehending these variations. This theory advances our knowledge of financial management in a real-world setting with imperfect markets while simultaneously challenging established paradigms (Byoun, 2008; Graham and Harvey, 2001).

2.1.6 Mediating Effects: The Baron and Kenny Framework

Baron and Kenny's (1986) mediation concept is pivotal for understanding how capital structure impacts firm risk-taking and performance. Using this strategy, the consequences of variables such as leverage—both direct and indirect—on corporate risk-taking and overall firm performance are outlined. Within this framework, it is demonstrated that there is a substantial relationship between leverage and risk-taking, that risk-taking affects firm performance, and that incorporating it into the analysis decreases the direct impact of leverage on performance. This approach is especially

applicable to our research on the Chinese machinery industry, as decisions over capital structure have a direct impact on the risk-taking practices and performance of the companies involved.

In support of this, Boateng et al. (2017) draw attention to how corporate governance impacts risk and capital structure as well as how financial strategies and risk management are affected in Chinese companies. Bo and Zhang (2002) shed light on the ways that differing institutional frameworks cause state-owned enterprises in China to act differently when it comes to risk than private companies. In order to optimize performance and efficiently manage risks, Vasiliou and Iriotis (2002) also discuss how firms modify their capital structures in reaction to market conditions.

2.2 Emerging Market Dynamics and Capital Structure in China

Due to different institutional frameworks and market conditions, capital structure theories—which have been researched extensively in Western economies—need to be adjusted when applied in emerging markets. Determining the appropriate capital structure is influenced differently in these markets due to market inefficiencies, significant government interventions, and evolving financial systems.In China, government policies, regulatory frameworks, and state ownership each have a significant impact on how companies make financial decisions.

The Pecking Order Theory needs to be modified to take into account the dominance of state-owned companies and the availability of state-backed finance. The theory contends that firms prioritize internal financing over external debt and external debt over equity due to knowledge asymmetry. According to this theory, Chinese firms may have distinct financing preferences due to state support and state-owned banks' preferential lending practices.

The Trade-Off Theory is also adjusted for the Chinese context, weighing the benefits of debt compared to the disadvantages of financial distress. Government support programs and bailouts decrease the perception of bankruptcy risk, enabling firms to use more leverage than those in less-regulated markets. The need of taking trade-offs into account when making decisions is emphasized by Campbell and Kelly (1994), particularly when dealing with competing criteria while deciding on a capital structure. Additionally pertinent is Baker and Wurgler's (2002) Market Timing Theory. According to this theory, firms issue equity at high market valuations and

repurchase it at low valuations. Due to the cyclicality and volatility of financial markets, firms may take advantage of inefficiencies in the stock market more aggressively in emerging nations like China.

Bougatef (2014) also emphasizes the importance of institutional quality in emerging markets, where decisions regarding capital structure are heavily influenced by concerns with governance and corruption. Companies operating in such markets face a challenging environment where institutional weaknesses and governmental interference can affect financial strategy (Bougatef, 2014).

3. Literature Review

3.1 Capital Structure in China’s Machinery Sector

A vital part of China's industrial strategy, the machinery sector contributes significantly to the GDP and is essential to the global manufacturing supply chain. China's export-oriented economic strategy has placed a strong emphasis on the industry since its WTO accession in 2001. The country has made significant state-backed investments in the industry to enhance its technological capabilities and production efficiency, which has improved China's standing in the global manufacturing rankings (Allen, Qian, and Qian, 2005; State Council of the People's Republic of China, 2015).

China aims to establish itself as a leader in high-tech industries such as robotics and advanced machinery, rather than just a hub for quantity-focused manufacturing, as demonstrated by the "Made in China 2025" project. Although it faces obstacles such as industrial overcapacity and inefficiencies aggravated by rapid scale expansion and governmental intervention, this strategic pivot intends to improve innovation and quality across its production procedures (Hao and Lu, 2014; Li et al., 2018).

In this sector, choices regarding capital structures are influenced by intricate connections among governmental regulations and market conditions. Firms in this sector, which are typically defined by high levels of leverage, usually depend on debt financing made possible by government subsidies and state-owned banks. Although there are inherent financial risks associated with high

leverage levels, these implicit government guarantees lessen perceived bankruptcy risks, allowing for expanding technical and capacity growth (Harris and Raviv, 1991; Jahanzeb et al., 2013).

Nevertheless, the industry's aspirations are constrained by significant structural issues. Mixed outcomes have been observed with attempts to reduce overcapacity through worldwide expansion and market-driven reforms. Chinese firms operating overseas encounter increased attention and opposition, especially from Western markets concerned about China's purposeful state-led capital allocations and their consequences for international trade dynamics (Campbell and Kelly, 1994; Baker and Wurgler, 2002).

Baker and Wurgler (2002) and Jahanzeb et al. (2013) state that the current model, which emphasizes high-volume, low-cost production, conflicts with the drive to upgrade industrial capacities on a national level. China's demographic changes, characterized by a declining labor force, demand a shift towards manufacturing that is more dependent on technology in order to maintain productivity improvements.

3.2 Impact of Financial Theories

The distinct features of China's machinery industry necessitate a reevaluation of conventional financial theories concerning capital structure. Policymakers frequently promote high leverage with implicit guarantees, which lowers the perceived risk of financial distress but may introduce systemic risks during changes in the economy or in policy (Allen et al., 2017).

This situation makes the Pecking Order Theory difficult to implement, particularly in light of the influence of state-owned banks and companies which frequently are dependent on state-backed loans, that modifies the perception of debt and favors debt over equity for strategic state objectives (Cheng, Liu, and Chien, 2010). Furthermore, given China's dynamic market, the Market Timing Theory is especially pertinent. Companies modify their capital structures to take advantage of market highs and lows by repurchasing during downturns and issuing equity when values are attractive (Huang and Song, 2002).

The machinery industry's capital structure decisions are significantly impacted by government intervention, as seen by its active management that represents strategic responses to market

conditions. Reduced financing costs and bankruptcy risks are made possible by state influence, but it can also result in less than ideal capital allocation and heightened sensitivity to changes in policy (Fu, 2020).

3.3 Impact of Regulatory Frameworks on Leverage and Risk-Taking Behaviour

In China, regulatory frameworks have a crucial role in determining the strategic financial decisions undertaken by machinery sector companies, especially in relation to leverage and risk-taking. China's macroeconomic policies, which are designed to stabilize the economy and foster sustainable growth, have a strong connection with these regulations. The macroprudential policies of the Chinese government, which aim to preserve financial stability by limiting the unwarranted accumulation of corporate debt, are a prime example of such regulatory influence (Chen and Zha, 2018).

By imposing restrictions on leverage ratios and establishing guidelines for risk management and financial reporting, these policies explicitly target industries that are thought to be essential to a nation's economy, which includes the machinery sector. Global economic conditions as well as domestic financial goals, such as advancing technology or reducing speculative investment, have a significant impact on these regulatory actions.

For instance, at times of economic downturn, the government might ease lending requirements to encourage growth, yet during times of robust economic performance, it may tighten these requirements to avoid overheating. Firms must continue to be adaptable in order to make such dynamic modifications, continuously reviewing and adjusting their financial strategies to conform to the regulatory landscapes of the present moment.

3.4 Institutional Environments and Their Effects on Capital Structure Choices

The foundational framework provided by China's institutional environment has a significant impact on corporate financial decisions, especially when it concerns the way leverage affects firm

valuation. The legal system, the growth of the financial markets, and the changes in corporate governance procedures are all parts of this ecosystem. Firms can participate in financial strategies with reduced risks of legal challenges or defaults in areas with well-established legal systems, efficient law enforcement, and well-defined property rights (Allen, Qian, and Zhang, 2005). This encourages investors and lenders to have greater trust in each other, which may result in lower costs of capital and better credit conditions.

Furthermore, the landscape for corporate financing has transformed dramatically as a consequence of the growth of China's financial markets. More complex financial instruments, such as equity derivatives and convertible bonds, have been introduced, offering companies more options to manage their capital structures more skillfully (Fan, Wong, and Zhang, 2007). These instruments provide flexibility in handling obligations and investment risks, which can be especially helpful to firms in this rapidly changing machinery industry.

Aiming to bring Chinese corporate governance practices into line with global norms, China has also implemented major reforms (Clarke, 2003). More accountability and openness are required, especially in areas that are closely regulated, which is why these reforms have been necessary. Better financial resource management, particularly the use of leverage, can result from improved corporate governance. Companies possessing robust governance frameworks will more likely choose to employ debt more prudently, making sure that borrowed funds are put toward value-adding activities as opposed to riskier ones. This reduces the volatility connected to high leverage levels and raises the firm's market valuation.

3.5 Comparative Analysis of Leverage Impact Across Regions Within China

With the wide variations in economic conditions throughout the nation, the effect of leverage on the performance of Chinese firms across different regions is a topic of great interest. Studies such as those by Allen, Qian, and Zhang (2005) demonstrate how corporate capital structures and financial strategies are influenced by various regional economic policies, market conditions, and institutional capacities. Firms which are located in economically developed countries, including the coastal regions of Eastern Europe, receive the advantages of more favorable business

environments and well-established financial infrastructures. These benefits provide firms with access to a wide variety of financing options at competitive rates, empowering them to better manage leverage in order to spur innovation and growth.

On the other hand, firms in China's less developed innermost regions encounter a variety of difficulties that affect how they utilize leverage. According to research by Fan, Wong, and Zhang (2007), local firms may have restricted access to national and international capital markets, and these regions frequently lack sophisticated financial services. These companies may find it more difficult to use different financing sources and increased borrowing costs to successfully leverage their growth, which could stifle innovation and expansion.

In addition to highlighting the various effects of leverage on company performance, the significance of taking local variables into account when developing financial strategies by offering a thorough comparative examination of these geographical variations is emphasized. This aspect is underscored in the work of Tsai (2007), who explores how regional disparities in economic development influence corporate financing decisions in China. Policymakers and business strategists should both take note of this work, as it offers valuable insights into how customized, regional policies might improve economic outcomes and maximize corporate financial strategies in various regions of China.

4. Hypothesis Development

The relationship between corporate risk-taking and capital structure is extensively explored in various academic studies, particularly in the context of emerging markets and sectors with significant government intervention. Studies such as those by Kraus and Litzenberger (1973), Modigliani and Miller (1958), Myers (1984), Myers and Majluf (1984) and Baker and Wurgler (2002) provide a solid theoretical foundation for understanding these dynamics. Recent studies, such as the one by Jahanzeb et al. (2013), highlight the significant role of the Market Timing Theory in capital structure decisions, challenging the dominance of the Trade-Off and Pecking Order Theories.

Hypothesis 1: The leverage has a significant impact on corporate risk-taking.

According to agency theory, managers in leveraged companies may pursue higher-risk projects in order to capitalize on potentially higher returns. This theory is consistent with the hypothesis that leverage has a positive impact on corporate risk-taking in the dynamic and highly competitive Chinese machinery sector. This behavior is motivated by the need to optimize shareholder value and make efficient use of financial leverage derived from debt. However, leverage, according to Ibhagui and Olokoyo (2018), may encourage companies to take on risks yet can also steer them toward improper financial practices that could lead them in serious financial distress. Furthermore, Alexopoulos et al. (2018) stress that having an excessive amount of leverage might worsen one's financial situation, suggesting that while taking more risks can have benefits, there are also serious potential consequences.

Hypothesis 2: Leverage has a significant impact on Tobin's Q.

A measure of firm value termed Tobin's Q and leverage have a complex relationship that depends on a number of variables. Originally, Modigliani and Miller (1963) claimed that leverage increases firm value through the tax shield benefits of debt financing, which in turn has a favorable impact on Tobin's Q. However, empirical data indicates that leverage has a complex relationship with Tobin's Q, with both positive and negative impacts. Zhang, Zheng, and Fan (2023), for instance,

discover that companies with moderate levels of leverage typically have greater Tobin's Q, suggesting a positive relationship between leverage and firm value. On the other hand, excessive leverage might cause financial distress and enhance the risk profile of the company, which may decrease Tobin's Q. This emphasizes how crucial it is to balance debt financing with the creation of firm value in order to maximize Tobin's Q.

Hypothesis 3: Leverage has a significant impact on Tobin's Q, mediated by corporate risk-taking.

This hypothesis examines the role that corporate risk-taking performs as a mediator in the connection between leverage and Tobin's Q. It makes the claim that efficient risk management can have a big impact on how leverage affects a firm's valuation. Companies with strategic risk management frameworks may mitigate the negative consequences of excessive leverage, improving Tobin's Q and overall firm value, according to Khan, Qin, and Jebran (2019). Thus, the degree to which companies include risk management into their strategy planning will determine the relationship between leverage and Tobin's Q in the Chinese machinery sector. This emphasizes the significance of coordinating financial strategies with thorough risk assessment processes.

5. Methodology

5.1 Introduction and Research Methodology

The relationship between corporate capital structure and firm value has received an excessive amount of focus in corporate finance literature. Academics have explored each of the variables which affect this relationship, for instance long-term debt and leverage, as well as their impact on corporate risk-taking behavior and firm value according to Forte and Tavares (2019)[2]. According to Gavish and Kalay (1983), when the value provided by debt equals its cost, shareholders are more inclined to invest in riskier initiatives, raising corporate risk-taking levels.

[2] Long-term debt negatively impacts firm performance due to the significant risk of default and credit (Forte and Tavares, 2019).

The impact of debt constraints on corporate risk-taking behavior has also been observed by academics. Firms usually exhibit less risk-taking behavior when faced with severe debt constraints, according to Paligorova (2010) and Dichev and Skinner (2002). Xu and Li (2008) proposed a relationship between lower levels of overinvestment and reduced risk-taking and higher levels of short-term debt in listed companies. According to Jiang and Shen (2005), there is a correlation between higher long-term debt ratios and higher corporate risk-taking. This is the case since high long-term debt ratios might result in overinvestment, sometimes referred to as asset substitution behavior.

According to these studies, debt levels are a crucial component of capital structure, and high levels of debt may encourage firms to take on more risk and consequently expose the entire company to more risk. Studies by Jensen and Meckling (1976) demonstrate how debt can influence firm behavior by increasing the propensity for risk-taking, as firms may be encouraged to participate in high-risk initiatives if they believe the rewards could be substantial. Risk-taking can benefit shareholders if everything progresses well, however in the event of issues, creditors suffer the most from risk losses. Shareholders may therefore incentivize management to pursue higher-risk operations, which would raise corporate risk-taking levels overall.

The current study aims to investigate the intermediary effect of risk-taking behaviour in the relationship between debt ratio, debt maturity, and firm value. Specifically, we hypothesise that Leverage, Risk, Assets Tangibility, Return on Equity, Company Size, Short-Term Borrowings influence firm values through their impact on corporate risk-taking efficiency and performance equally, resulting in non-linear changes in enterprise value.

This study employs a quantitative research approach, utilising empirical data from the Chinese stock exchanges to test the proposed hypotheses. We employ statistical methods such as to analyse the data and evaluate the relationships between debt structure and risk-taking behaviour for the existence of literature and test our hypothesis of the impact of leverage and other factors on Tobin's Q will change under the intermediary effect of corporate risk-taking in the Chinese machinery industry.

5.2 Econometric Methodology

5.2.1 The Mediation Analysis

This approach uses Baron and Kenny (1986)'s hierarchical regression analysis paradigm to examine how an independent variable affects a dependent variable through one or more intermediary variables. These mediators clarify the predictive-outcome link by revealing data relationships. In three steps, we explored corporate risk-taking mediating functions. Models 1–3[3] used leverage ratio as an explanatory variable.

We then examined the indirect impact of capital structure on business risk by adding corporate risk-taking as a mediating variable. Further regression studies using hierarchical regression analysis allowed us to comprehensively evaluate mediating influences and their involvement in capital structure and business risk transmission. We then used these analytical results to create a comprehensive model to better comprehend capital structure, company risk-taking, and corporate risk. This model includes direct and intermediary effects for a more complete understanding. Finally, we used hierarchical regression analysis to examine the direct and indirect effects of capital structure on business risk to better understand the link between these factors.

Model 1: Mediating Effect of Corporate Risk-Taking

$$RISK_{it} = \alpha_0 + \alpha_1 LEV_{it} + \alpha_2 RISK_{it} + \alpha_3 DEPR_{it} + \alpha_4 TANG_{it} + \alpha_5 GROPP_{it} + \alpha_6 ETR_{it} + \alpha_7 QRATIO_{it} + \alpha_8 CRATIO_{it} + \alpha_9 MCAP_{it} + \alpha_{10} CASH_{it} + \alpha_{11} STR_{it} + \alpha_{12} LTR_{it} + \alpha_{13} RERATE_{it} + \varepsilon_{it}$$

Model 2: Mediating Effect of Corporate Investment Return

$$Tobin's\ Q_{it} = \beta_0 + \beta_1 LEV_{it} + \beta_2 LEV_{it^2} + \beta_3 RISK_{it^2} + \beta_4 RISK_{it} + \beta_5 DEPR_{it} + \beta_6 TANG_{it} + \beta_7 GROPP_{it} + \beta_8 ETR_{it} + \beta_9 QRATIO_{it} + \beta_{10} CRATIO_{it} + \beta_{11} MCAP_{it} + \beta_{12} CASH_{it} + \beta_{13} STR_{it} + \beta_{14} LTR_{it} + \beta_{15} RERATE_{it} + \varepsilon_{it}$$

Model 3: Comprehensive Model

[3] Our baseline model contains capital structure (leverage) as the independent variable and corporate risk as the dependent variable, while controlling for other potential influencing factors like depreciation expenses, asset tangibility, growth opportunities, effective tax rate, and others

$$Tobin's\ Q_{it} = \gamma_0 + \gamma_1 LEV_{it} + \gamma_2 LEV_{it^2} + \gamma_3 RISK_{it^2} + \gamma_4 RISK_{it} + \gamma_5 RISK_{it} + \gamma_6 RISK_{it^2} + \gamma_7 DEPR_{it} + \gamma_8 TANG_{it} + \gamma_9 GROPP_{it} + \gamma_{10} ETR_{it} + \gamma_{11} QRATIO_{it} + \gamma_{12} CRATIO_{it} + \gamma_{13} MCAP_{it} + \gamma_{14} CASH_{it} + \gamma_{15} STR_{it} + \gamma_{16} LTR_{it} + \gamma_{17} RERATE_{it} + \varepsilon_{it}$$

5.2.2 Correlation Analysis and Multiple Linear Regression

To choose the best empirical financial research approach for this topic, consider and discuss many. As indicated, a large dataset lets us compare multiple analytical methods for measuring the capital structure's impact on Chinese equipment manufacturing business risks.

Capital structure and firm risk have been studied using correlation and multiple regression (Rajan and Zingales, 1995). The study will address endogeneity after correlation analysis. Correlation coefficients describe the degree and direction of a linear relationship between two variables (Pearson, 1895). It does not prove causality or predictability. This simplified method measures relationships without causality or prediction. Thus, multiple linear regression analysis explores and explains complicated variable correlations, investigates causal links, uncovers interactions, and improves modelling and prediction, boosting comprehension of influencing factors and model explanatory power. Gujarati and Porter (2009) recommend multiple linear regression to understand financial variable magnitude and direction.

LEV, COMSIZE, and D/E are dependent variables in multiple linear regression analysis to explore their connections. This study may highlight the independent effects of each component on stock price volatility while controlling for other factors, revealing capital structure and corporate risk. Formulating the correlation model:

$$r = \frac{\sum_{i=1}^{n} = 1(x_i - \bar{\mathrm{x}})(y_i - \bar{\mathrm{y}})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{\mathrm{x}})^2}\ \sqrt{\sum_{i=1}^{n}(y_i - \bar{\mathrm{y}})^2}}$$

Additionally, the multiple linear regression model aims to establish a linear relationship between a dependent variable (stock price volatility) and multiple independent variables (Handayani, et. al., 2018). This model not only reveals correlations between variables but also determines the extent of influence of independent variables on the dependent variable and predicts its values

(Binder and Merges, 2001). The multiple linear regression model for stock price volatility is represented as:

$$y_{it} = \beta_0 + \beta_1 TANG_{it} + \beta_2 GROPP_{it} + \cdots + \beta_n MCAP_{it} + \varepsilon_{it,t} = 1,2$$

In this model, it represents the value of stock price volatility at time t and unit i. β0 to β14 respectively denote the coefficients in the model. LEVit, COMSIZEit, D/Eit, etc., represent the values of the selected independent variables at time t and unit i. Control variables like DEPRit, TANGit, GROPPit, etc., are similarly included in the model. εit stands for the error term in the model.

5.2.3 Ridge Regression, and Lasso Regression

Ordinary Ridge Regression serves as a robust tool for tackling multicollinearity concerns within a dataset. By incorporating ridge parameters, this method effectively penalises the magnitudeRidge regression is a classical regression analysis method used to address multicollinearity issues (Hoerl and Kennard, 1970). The core concept involves adjusting the model's coefficients by introducing a regularisation term on OLS, aiming to reduce the influence of excessively high coefficients and improve the model's generalisation ability. The mathematical expression of ridge regression is as follows:

$$\hat{\beta}^{ridge} = (X^T X + \lambda I)^{-1} X^T y$$

In ordinary least squares regression, the goal is to minimise the residual sum of squares RSS, given by RSS = Σ(yi - ŷi)², where yi represents the actual values and ŷi denotes the predicted values. Ridge regression introduces a regularisation term by adding a penalty parameter λ (lambda) to adjust the model and prevent overfitting. The regularised residual sum of squares is represented as:

$$\sum (y_i - \widehat{y_i})^2 + \lambda \sum \beta^2$$

In the above formula, the first part still represents the residual sum of squares, while the second part is the regularisation term, calculated as the sum of squared coefficients multiplied by λ. This

new residual sum of squares comprehensively considers both the model's fit and the magnitude of coefficients during the minimization process, striking a balance between model complexity and prediction accuracy.

Lasso regression, which is also known as L1 regularization, operates differently compared to ridge regression (Ranstam and Cook, 2018). While the L2 penalty in ridge regression shrinks coefficients towards zero but never to absolute zero, slimming down the set of variables influencing the model's output (Tibshirani, 1996). Lasso regression takes a more aggressive approach, feature weights can be reduced to zero, effectively removing the associated predictor from the model. This feature distinguishes lasso regression as a robust regularization method in linear regression, offering a different approach to reducing model complexity compared to ridge regression.

$$L_{lasso}(\hat{\beta}) = \sum_{i=1}^{n}(y_i - x_i^T\hat{\beta})^2 + \lambda\sum_{j=1}^{m}|\hat{\beta}_j|$$

Both lasso regression and ridge regression serve to simplify model structures, but through distinct mechanisms. While lasso regression directly eliminates variables by setting their coefficients to zero, ridge regression reduces the impact of each variable on the output without eliminating any completely. We are going to use these two methods to get accurate results.

5.2.4 Mixed - Effects and Fixed Regressions

5.2.4.1 Mixed - Effects

The mixed-effects model takes into account both fixed-effects and random-effects providing flexible analysis over complex data structures (Farkas, 2005). This model allows us to address variations both within and across different groups or entities, which is particularly useful in assessing the dynamic and diverse environment of the Chinese machinery industry (Huang and Zengrui, 2023).

Given the complexity of the dataset, which incorporates multiple variables across different time periods, it is crucial to consider a time point fixed effects model. The fixed effects model reveals time-specific changes within the dataset, which significantly influence the explanatory variables

in the economic data model (Hill et. al., 2020). Furthermore, the necessity of this model is underscored by the variations in different years due to changes in macroeconomic policies, market environments, or global economic events.

$$y_i jt = \beta_0 j + \beta_1 j X_{ijt} + u_j + \varepsilon_{ijt,t} = 1{,}2 \ (4)$$

Where $\beta_0 j = \beta_0 + u_0 j \ and \ \beta_1 j + u_1 j$ (5)

The time point fixed effects model is particularly effective in controlling for endogeneity issues, as it can isolate those factors that affect all observed units but vary over time, such as legal changes or technological innovations. This model allows for different intercepts at each time point, enabling precise capture and adjustment of effects due to changes over time, thereby enhancing the model's ability to explain and predict data fluctuations.

Specifically, the form of the time point fixed effects model is typically expressed as:

$$y_{it} = \gamma_t + \sum_{k=2}^{K} \beta_k x_{kit} + u_{it}$$

5.2.4.2 Fixed Regressions

In conducting empirical research within the Chinese machinery sector, particularly regarding how diverse capital structures influence company-specific risks, the methodology employed entails both logistic and Poisson regression analyses—each tailored to address specific types of dependent variables relevant to our inquiries about risk (Han and Bhattacharjee, 2014).

The logistic regression model is notably adept at handling binary or categorical outcome variables. This characteristic makes it indispensable for queries where the dependent variable is dichotomous, such as success or failure, presence or absence of financial distress, or identifiable risk potentials within firms. Hosmer, Lemeshow, and Sturdivant (2013) describe how logistic regression can effectively model such binary outcomes, providing a robust framework for examining the influences of predictors like leverage ratios, equity configurations, and liquidity measures.Specifically, this model has been utilized to explore the impacts of various capital structure attributes, like leverage ratios, equity configurations, and liquidity measures—on the probability of encountering significant financial challenges in Chinese machinery listed

companies. Research by Fan, Titman, and Twite (2012) offers insights into how capital structure decisions influence firm outcomes in China, demonstrating the applicability of logistic regression in this context.

The application of logistic regression allows us to measure the odds and predict the likelihood that certain financial structuring decisions will lead to distress or other undesirable outcomes. By examining logistic regression outcomes, we gain valuable insights into how specific elements of a company's capital structure might predispose it to increased vulnerability in terms of financial stability (Hosmer, Lemeshow and Sturdivant, 2013).

$$log = \left(\frac{p_{it}}{1 - p_{it}}\right) = \beta_0 + \beta_1 LEV_{it} + \cdots + \beta_n MCAP_{it,t} = 1,2$$

On the other hand, the Poisson regression framework is particularly suited to scenarios where the dependent variable represents count data, making it ideal for assessing the frequency or incidence of risk events over a specified period or within given conditions. Cameron and Trivedi (2013) highlight the effectiveness of Poisson regression for analyzing event counts, which can apply robustly to various fields including finance and risk management. For the Chinese machinery industry, where firm risks could manifest in multiple incidents—such as loan defaults, operational disruptions, or safety incidents—understanding the rate at which these risks materialise relative to capital structuring is critical (Gardner, Mulvey and Shaw, 1995; Wright, Gloudeman and Rosen, 2020).

$$log\ log\ (\mu_{it}) = \beta_0 + \beta_1 LEV_{it} + \cdots + \beta_n MCAP_{it,t} = 1,2(7)$$

5.3 The Sample Universe

5.3.1 Description of Variables

The variables utilized in this thesis are described in this section. The selection and measurement of each variable are backed by established theories and previous empirical research, ensuring their relevance and robustness in the examination of the capital structure and its impact on firm risk.

5.3.1.1 Independent Variables

As noted by Modigliani and Miller, leverage reflects the percentage of debt financing in the firm's capital structure (1958). Leverage will be used to characterize a company's capital structure because it indicates how dependent a company is on debt for funding (Hovakimian, Opler and Titman, 2001; Berk and DeMarzo, 2013). Abor (2005) discovered that long-term debt had a negative relationship with profitability, whereas short-term and total debt had a positive one. This study will include both short-term and long-term debt since the relationship with profitability may vary depending on the leverage measure. Thus, LEV is measured by *Total Debt / Total Assets.*

Similarly, as explored by Myers (1977), the Debt to Equity Ratio is essential for understanding the equilibrium between debt and equity financing, indicative of the firm's financial stability and capital structure strategy. These metrics are essential for evaluating the effects of capital structure decisions on a company's operational flexibility and financial health. The D/E is measured by:

$$D/E = \frac{Total\ Debt}{Total\ Equity}$$

In addition, financial structure and stock price volatility are impacted by company size. Understanding the size of a company is useful when assessing how its features affect risk management and financial decisions in the context of the Chinese machinery sector. In order to measure COMSIZE, we utilize the *Natural Logarithm of Total Assets.*

5.3.1.2 Dependent Variables

Stock price volatility is the variable used to depict the risk profile of Chinese machinery companies. This measure depicts how shifts in industry dynamics and market conditions impact stock prices, investor behavior and market perceptions as explored by Black (1976). We compute RISK by:

$$RISK = \frac{Max\ Price\ - Min\ Price}{Min\ Price}$$

5.3.1.3 Control Variables

The firm's investment in tangible assets is reflected in Asset Tangibility and is defined by *Tangible Assets to Total Assets*. Its effect on debt capacity has been discussed by Rajan and Zingales (2001). Smith and Stulz (1985) use the Cash Ratio to assess liquidity management which is computed as *CASH = Cash and Cash Equivalents / Total Assets*. According to Graham's (2000), understanding the Effective Tax Rate, given by *ETR = Tax expenses / EBT* is essential to comprehending tax impact on profitability. As a measure of short-term financial health, the Current Liquidity Ratio, calculated as *CRATIO = Current Assets / Current Liabilities* is frequently examined in liquidity studies such as those carried out by Wachowicz and Horne (2000). According to Ross et al. (2002), Depreciation is crucial to comprehending how asset value decreases over time. It is represented as:

$$DEPR = \frac{Depreciation\ Expense}{Total\ Assets}$$

Backed by studies from Titman and Wessels (1988), Growth Opportunity and Market Capitalization are vital for determining the firm's growth potential and market size. According to Harris and Raviv's (1991) research, the Long-Term Debt Ratio and the Quick Liquidity Ratio are used to assess debt maturity and immediate liquidity needs, respectively. The aforementioned variables are measured by:

$$GROPP = \frac{Changes\ in\ Sales}{Previous\ Year's\ Sales}$$

$$MCAP = log\ (Market\ Value\ of\ Equity)$$

$$LTR = \frac{Long\ Term\ Debt}{Total\ Debt}$$

$$QRATIO = \frac{Cash\ and\ Cash\ Equivalents\ +\ Current\ Receivables}{Current\ Liabilities}$$

Welch's liquidity analysis is related to the Short-Term Debt Ratio, which assesses the percentage of debt requiring repayment within a year (2004). Tobin's Q, which is often mentioned in research on investment decision-making, is a measure of market valuation in relation to the firm's assets (Chung and Pruitt, 1994). The variables mentioned above are computed as follows:

$$STR = \frac{Short\ Term\ Debt}{Total\ Debt},\ Tobin's\ Q = \frac{MCAP}{COMSIZE}$$

5.3.4 Sample Selection

Our research analyzes data from Capital IQ and Mendeley on machinery companies listed between 2018 and 2023 on the Shanghai, Shenzhen, and Beijing Stock Exchanges. We excluded firms listed on both domestic and international exchanges to avoid confounding regulatory effects. After data cleaning, we retained 2210 annual observations. Our study focuses on the impact of capital structure on corporate risk-taking, using variables like share price volatility, leverage, company size, and debt-to-equity ratio. Control variables include market capitalization, depreciation, debt levels, asset tangibility, and tax rate. Regression analysis is employed to explore these relationships, enhancing understanding of financial management in emerging markets.

5.3.5 Data Sample Representativeness

Our study utilizes a carefully selected sample of companies listed on the Shanghai, Shenzhen, and Beijing exchanges from 2018 to 2023 in order to ensure the validity of our results and the applicability of our conclusions within the Chinese machinery sector. This period has been deliberately chosen to cover key moments in economic reform and regulatory shifts that have an effect on corporate finance and capital structure decisions in China. The sample provides a well-rounded representative of the sector since it covers a varied spectrum of machinery companies, from large-scale corporations to smaller enterprises. The analysis of how various company sizes and types react to similar economic conditions is rendered feasible by this diversity, which is essential to comprehending the wider implications of our findings on capital structure and firm risk.

5.4 Delimitations of this Study

This thesis's focus on the publicly traded Chinese machinery industry limits its applicability to other industries or privately held companies. This focus is important because public financial data ensures data quality and reliability. Although this selection criteria improves data accuracy, it leaves out a large portion of the market, particularly smaller and privately owned companies with different risk profiles and financial habits due to operational pressures and less regulatory scrutiny.

The focus on publicly listed corporations may also hide the sophisticated financial strategies and economic constraints of smaller enterprises, which often operate in different environments. These companies may adopt more flexible or risk-averse financial arrangements for financial stability and growth. However, results may vary.

The retroactive character of this study (2018 – 2023) is another constraint. The equipment sector has been affected by important economic events and regulatory changes, but the historical approach limits our capacity to predict future patterns. Economic conditions, technology, and government policies are changing swiftly, especially in China's huge and globalised market. Because of this, old data may not precisely reflect future dynamics, and new economic policies and market changes may affect the relationships discovered.

Due to geographical and economic elements unique to China, the study may not apply to other countries with different regulatory frameworks, economic systems, or market situations. This geographic constraint prevents the study's findings from being applied outside China, thus caution is needed while doing so.

6. Empirical Results

6.1 Descriptive Statistics and Correlation

6.1.1. Descriptive Statistics

Key insights into the capital structure and its effects on firm risk in China's machinery sector over the previous five years can be gained from the summary statistics in Table 1. With a standard deviation of 1.35 and an average RISK of 1.15, the data indicate that different organizations have diverse risk profiles, indicating different approaches to risk management. Leverage (LEV) notably reaches 3.2222, indicating that certain companies may be highly leveraged, which, depending on their management approaches, may increase financial risks or improve returns.

The table additionally demonstrates notable differences in market capitalization (MCAP) and company size (COMSIZE), the latter of which peaked at 35959.9 and indicates the considerable impact of larger companies on the sector. These companies have the power to significantly change investor perceptions and market dynamics.

The industry's capital-intensive character is reflected in the high depreciation rates of 16.79%, which highlight asset management and influence tax and investment decisions. With current and quick ratios (CRATIO and QRATIO) averaging 2.37 and 1.07, respectively, liquidity management is also clear and enables both financial stability and strategic flexibility. In addition to shedding light on the strategies and financial health of the sector's companies, these metrics serve as crucial benchmarks for risk management and strategic decision-making in this hectic business environment.

Table 1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LEV	2,210	0.1236181	0.1804368	0	3.222222
COMSIZE	2,210	5.808836	1.259192	-0.1053605	10.74025
DEPR	2,210	16.79008	68.59085	0	1601.58
STR	2,210	53.23127	39.61996	0	100
LTR	2,210	23.3309	29.11221	0	100
RISK	2,210	1.154498	1.354852	0	12.85
TANG	2,210	0.5281159	0.8585333	0.0038819	20.11111
RERATE	2,210	0.4444514	3.094391	0	85.871
D_E	2,210	0.8022305	9.226435	0	393.4482
ETR	2,210	0.1251844	0.1145617	0	1.9455
GROPP	2,210	1.566083	15.64123	0	687.7102
QRATIO	2,210	1.706199	1.5802	0.1	21.8
CRATIO	2,210	2.366833	1.809844	0.1	23.4
MCAP	2,210	904.2509	2099.246	0	35959.9
CASH	2,210	0.1664272	0.1119017	0	0.7142061
non_numeri~t	2,210	0	0	0	0
panel_id	2,210	1182.476	694.2995	3	2404
year_num	2,210	1182.476	694.2995	3	2404
LEV_pred	2,210	1.25E-09	3.38E-09	-3.36E-10	6.56E-08
LAG_LEV	2,210	0.1232064	0.1802713	0	3.222222
_est_est1	2,210	1	0	1	1
_est_est2	2,210	1	0	1	1
resid	2,210	1.81E-08	55.48511	-380.4002	1293.828

Note: The variables that are included in Table 2 are (a) **LEV** (Leverage), the ratio of total debt to total assets, which indicates financial leverage; (b) **COMSIZE** (Company Size), the natural logarithm of total assets, reflecting the size of the company; (c) **DEPR** (Depreciation), the ratio of total depreciation expense to total assets, which provides insight to asset depreciation policies; (d) **STR** (Short-Term Ratio), the proportion of short-term debt relative to total debt; (e) **LTR** (Long-Term Ratio), the proportion of long-term debt which is relative to total debt; (f) **RISK**, which is calculated as the variance of returns, and measures the variability in firm performance; (g) **TANG** (Tangibility), the ratio of tangible assets to total assets, showing asset reliability; (h) **RERATE** (Reinvestment Rate), the portion of net earnings reinvested in the company, indicative of growth potential; (i) **D_E** (Debt to Equity Ratio), total liabilities divided by shareholders' equity, reflecting the company's leverage; (j) **ETR** (Effective Tax Rate), taxes which are paid as % of the taxable income and assessing tax efficiency; (k) **GROPP** (Growth Opportunities), the year-over-year % change in revenues, indicating growth; (l) **QRATIO** (Quick Ratio) and (m) **CRATIO** (Current Ratio), measures of liquidity calculated by dividing liquid assets by current liabilities and current assets by current liabilities; (n) **MCAP** (Market Capitalization), the total market value of the company's outstanding shares; (o) **CASH**, cash and cash equivalents as % of the total assets, indicating liquidity. Additional variables such as **non_numeri-t, panel_id, year_num, LEV_pred, LAG_LEV, _est_es1, _est_es2**, and **resid** are used for regression diagnostics and are not central to the main statistical analysis but are critical for validating the regression models employed.

6.1.2 Correlation Analysis

Table 2 shows Pearson's correlation matrix for key Chinese equipment industry financial measures. Several variables crucial to understanding industrial capital structure and risk management are correlated. At 0.5311, market capitalization (MCAP) and business size (COMSIZE) show a strong positive correlation, supporting the idea that larger enterprises have higher market values. This association supports the industry dominance of larger enterprises.

TANG and RISK have a strong positive correlation of 0.6206, showing that organisations with more tangible assets take on higher-risk initiatives. This is frequent in capital-intensive businesses like equipment. A trade-off exists between leverage (LEV) and liquidity (-0.2894) with the quick ratio. Lower liquidity from higher leverage may hinder operational flexibility and financial distress response.

The negative association between the debt to equity ratio (D_E) and cash reserves (CASH) at -0.2160 suggests that highly leveraged enterprises have fewer cash reserves and prioritise debt over liquidity. This may put a company's finances at danger and affect its ability to handle fluctuating markets.

These correlations illuminate the financial dynamics of Chinese machinery companies, but most are moderate, indicating that while financial metrics are connected, they still have distinct effects on the industry's financial environment. These relationships also demonstrate the need for proactive financial management to mitigate risks from excessive leverage and asset tangibility in the capital-intensive business. This research helps organisations make decisions by explaining the complex relationships between equipment industry finance procedures. Wooldridge (2016) advises taking these interactions into account when undertaking econometric modelling to avoid multicollinearity, which can impact statistical results.

Table 2: Pearson's Correlation Matrix

Variables	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)
(a) LEV	1.0000	0.0595*	0.0873*	0.0579*	0.2351*	-0.0713*	0.6206*	0.1741*	0.0281	-0.0500	0.0276	-0.2894*	-0.3168*	0.0262	-0.1193*
(b) COMSIZE	0.0595*	1.0000	0.4324*	-0.0922*	0.2637*	0.1517*	-0.2796*	0.0897*	-0.0308	0.0222	-0.0094	-0.1621*	-0.1895*	0.5311*	0.0051
(c) DEPR	0.0873*	0.4324*	1.0000	-0.0774*	0.1602*	0.0079	-0.0546	0.0336	-0.0002	0.0140	-0.0064	-0.0793*	-0.0946*	0.5778*	0.0103
(d) STR	0.0579*	-0.0922*	-0.0774*	1.0000	-0.5097*	-0.0882*	-0.1018*	0.0328	0.0354	0.0179	0.0196	-0.2832*	-0.2924*	-0.0747*	-0.2160*
(e) LTR	0.2351*	0.2637*	0.1602*	-0.5097*	1.0000	0.1456*	0.0821*	0.0054	-0.0173	-0.0356	-0.0172	-0.0019	-0.0086	0.1552*	0.0325
(f) RISK	-0.0713*	0.1517*	0.0079	-0.0882*	0.1456*	1.0000	0.0119	-0.0213	-0.0325	-0.1170*	-0.0208	0.1749*	0.1713*	0.2832*	0.1864*
(g) TANG	0.6206*	-0.2796*	-0.0546	-0.1018*	0.0821*	0.0119	1.0000	0.0461	0.0187	0.0531	0.0149	0.1130*	0.1127*	0.0397	0.1765*
(h) RERATE	0.1741*	0.0897*	0.0336	0.0328	0.0054	-0.0213	0.0461	1.0000	0.0001	-0.0309	-0.0054	-0.0671*	-0.0752*	0.0013	-0.0185
(i) D_E	0.0281	-0.0308	-0.0002	0.0354	-0.0173	-0.0325	0.0187	0.0001	1.0000	0.0147	0.0125	-0.0291	-0.0347	-0.0085	-0.0078
(j) ETR	-0.0500	0.0222	0.0140	0.0179	-0.0356	-0.1170*	0.0531	-0.0309	0.0147	1.0000	0.0027	0.0309	0.0264	-0.0075	0.0027
(k) GROPP	0.0276	-0.0094	-0.0064	0.0196	-0.0172	-0.0208	0.0149	-0.0054	0.0125	-0.0056	1.0000	-0.0177	-0.0221	-0.0162	-0.0086
(l) QRATIO	-0.2894*	-0.1621*	-0.0793*	-0.2832*	-0.0019	0.1749*	0.1130*	-0.0671*	-0.0291	0.0309	-0.0177	1.0000	0.9614*	-0.0394	0.3998*
(m) CRATIO	-0.3168*	-0.1895*	-0.0946*	-0.2924*	-0.0086	0.1713*	0.1127*	-0.0752*	-0.0347	0.0264	-0.0221	0.9614*	1.0000	-0.0565*	0.3376*
(n) MCAP	0.0262	0.5311*	0.5778*	-0.0747*	0.1552*	0.2832*	0.0397	0.0013	-0.0085	-0.0075	-0.0162	-0.0394	-0.0565*	1.0000	0.0436
(o) CASH	-0.1193*	0.0051	0.0103	-0.2160*	0.0325	0.1864*	0.1765*	-0.0185	-0.0078	0.0027	-0.0086	0.3998*	0.3376*	0.0436	1.0000

Note: Pearson's Correlation Matrix. The variables included in the table are (a) **LEV** (Leverage), the ratio of total debt to total assets; (b) **COMSIZE** (Company Size), logarithm of the total assets; (c) **DEPR** (Depreciation), depreciation expense as a percentage of total assets; (d) **STR** (Short-Term Ratio), ratio of short-term debt to total debt; (e) **LTR** (Long-Term Ratio), ratio of long-term debt to total debt; (f) **RISK**, standard deviation of the firm's returns; (g) **TANG** (Tangibility), ratio of tangible assets to total assets; (h) **RERATE** (Reinvestment Rate), percentage of earnings reinvested in the business; (i) **D_E** (Debt to Equity Ratio), ratio of total debt to shareholder's equity; (j) **ETR** (Effective Tax Rate), tax expense divided by pretax profit; (k) **GROPP** (Growth Opportunities), year-over-year growth in revenues; (l) **QRATIO** (Quick Ratio), indicator of liquidity, calculated as current assets minus inventories divided by current liabilities; (m) **CRATIO** (Current Ratio), current assets divided by current liabilities; (n) **MCAP** (Market Capitalization), total market value of the company's shares; (o) **CASH**, cash and cash equivalents as a percentage of total assets.

*p<0.10, **p<0.05, ***p<0.01

6.2 Modelling Risk with Lasso, Fixed, and Mixed Effects

To accurately quantify the impact of various financial variables on company risk, we employed multiple regression analysis methods, including Lasso regression, fixed effects regression, and mixed effects regression. Here is a detailed analysis of the results of these regression models.

6.2.1 Lasso Regression Results

Based on the Model 1, leverage (LEV) exhibited a negative correlation with a coefficient of -0.4575, not reaching statistical significance (t = -1.86). Conversely, company size (COMSIZE) demonstrated a positive correlation with a coefficient of 0.0629, showing a higher level of significance (t = 2.23). Debt to equity ratio (D_E) displayed a slight negative correlation, with a coefficient of -0.0026, yet it was not statistically significant (t = -0.93). On the other hand, depreciation (DEPR) showed a significant negative correlation with the target variable, with a coefficient of -0.0045 and a high t-value of -9.57.

The Lasso regression indicates that company size and depreciation have significant impacts on risk, while the negative impact of leverage is not statistically significant.

6.2.2 Fixed Effects Regression Results

Firstly, the first variable shows a coefficient of -0.458, a standard error of 0.2455, and a t-value of -1.86, suggesting a relatively strong negative correlation with the target but without reaching statistical significance in the Model 2. Secondly, the second variable has a coefficient of 0.063, a standard error of 0.0282, and a t-value of 2.23, indicating a positive correlation with statistical significance. The third variable exhibits a slight negative correlation with a coefficient of -0.003 but is not statistically significant (t = -0.93). However, the fourth variable demonstrates a significant negative correlation with a coefficient of -0.0045 and a high t-value of -9.57.

Consistent with the Lasso regression results, leverage's impact is not significant, but company size has a significant positive effect on risk.

6.2.3 Mixed Effects Regression Results

Based on the Model 3 on the mixed effects coefficients and standard errors, the coefficients and standard errors of each variable vary in magnitude, indicating differences among the variables. Specifically, the coefficients range from -4.97E-10 to 9.79E-11, showing fluctuations at a small scale. The standard errors range between 1.24E-09 and 1.96E-06. The results of the mixed effects model show fluctuations in the effects of variables under different effects, but the main trends remain consistent.

6.2.4 Regression Results

In this regression table, we conducted detailed analyses of each variable to understand their roles in the model. Firstly, regarding the leverage (LEV) variable, a coefficient of -0.4574688 was observed, indicating a negative trend with risk, albeit not statistically significant ($p=0.062$). Secondly, company size (COMSIZE) demonstrated a significant positive correlation with a coefficient of 0.062935 and a t-value of 2.23 ($p=0.026$). The depreciation (DEPR) variable had a significant negative impact, with a coefficient of -0.0045393 and a t-value of -9.57 ($p<0.01$), suggesting a noticeable risk-reducing effect of depreciation. Other variables such as tangible assets (TANG), effective tax rate (ETR), and cash (CASH) also showed some level of influence, providing us with a deeper understanding of dynamics in corporate risk.

Through the analyses of each variable in the regression table, we identified a significant association between company size (COMSIZE) and depreciation (DEPR) with risk, whereas the impact of leverage (LEV) was not significant. This underscores the importance of considering factors like company size and depreciation when evaluating corporate risk dynamics.

6.2.5 Summary

Based on the models' results, we got that Company size has a significant positive impact on company risk, implying that larger companies should exercise caution in capital structure and risk management. And the depreciation has a significant negative impact on company risk, indicating

that companies with higher asset depreciation may be more robust in risk management. Although the negative impact of leverage is not significant, its trend suggests that high leverage may be associated with lower risk, warranting further investigation.

Table 3: Regression Results: Model 1 - 4

	Model 1			*Model 2*			*Model 3*		*Model 4*					
Variable	**Lasso Regression Coef.**	**Lasso Regression Std. Err.**	**Lasso Regression t**	**Fixed Effects Coef.**	**Fixed Effects Std.Err.**	**Fixed Effects t**	**Mixed Effects Coef.**	**Mixed Effects Std. Err.**	**RISK Coef.**	**RISK Std. Err.**	**RISK t**	**RISK P>|t|**	**RISK [95% Conf.]**	**RISK Interval**
LEV	-0.4575	0.2455	-1.86E+00	-4.58E-01	0.2455	-1.86	-4.97E-10	1.96E-06	-0.4574688	0.245462	-1.86	0.062	-0.9388309	0.0238933
COMSIZE	0.0629	0.0282	2.23E+00	6.29E-02	0.0282	2.23	2.51E-11	2.76E-07	0.062935	0.0282089	2.23	0.026	0.0076161	0.1182539
D_E	-0.0026	0.0028	-9.30E-01	-2.60E-03	0.0028	-0.93	2.49E-13	9.80E-09	-0.0026297	0.0028236	-0.93	0.352	-0.008167	0.0029077
DEPR	-0.0045	0.0005	-9.57E+00	-4.50E-03	0.0005	-9.57	3.11E-11	6.14E-08	-0.0045393	0.0004742	-9.57	0	-0.0054692	-0.0036094
TANG	0.029	0.0501	5.80E-01	2.90E-02	0.0501	0.58	9.79E-11	3.40E-07	0.0289798	0.0500567	0.58	0.563	-0.0691837	0.1271433
GROPP	-0.0008	0.0017	-4.50E-01	-8.00E-04	0.0017	-0.45	1.04E-12	1.74E-08	-0.0007547	0.0016627	-0.45	0.65	-0.0040153	0.002506
ETR	-1.349	0.2274	-5.93E+00	-1.35E+00	0.2274	-5.93	-2.89E-10	2.39E-06	-1.349023	0.2274073	-5.93	0	-1.794979	-0.9030666
QRATIO	-0.0316	0.0629	-5.00E-01	-3.16E-02	0.0629	-0.5	-3.10E-11	6.15E-07	-0.0316114	0.0629191	-0.5	0.615	-0.1549987	0.0917759
CRATIO	0.1355	0.0552	2.46E+00	1.36E-01	0.0552	2.46	2.35E-11	5.54E-07	0.1354902	0.0551857	2.46	0.014	0.0272684	0.2437119
MCAP	0.0002	0	1.43E+01	2.00E-04	0	14.32	7.87E-13	1.24E-09	0.0002395	0.0000167	14.32	0	0.0002067	0.0002723
CASH	1.5623	0.2706	5.77E+00	1.56E+00	0.2706	5.77	-9.08E-10	2.35E-06	1.562332	0.2706413	5.77	0	1.031593	2.093072
STR	0.003	0.0008	3.57E+00	3.00E-03	0.0008	3.57	-4.05E-14	5.34E-09	0.0029756	0.0008334	3.57	0	0.0013413	0.0046098
LTR	0.0074	0.0011	6.52E+00	7.40E-03	0.0011	6.52	8.55E-14	9.60E-09	0.0074178	0.0011369	6.52	0	0.0051884	0.0096472
RERATE	-0.0007	0.0088	-8.00E-02	-7.00E-04	0.0088	-0.08	2.29E-11	3.09E-07	-0.0007422	0.0087603	-0.08	0.932	-0.0179216	0.0164373
_cons	0.0041	0.1865	0.02	0.0041	0.1865	0.02	4.76E-15	1.98E-15	0.0041071	0.1865158	0.02	0.982	-0.3616588	0.3698731

Note: This regression table displays the outcomes from four distinct models that assess the impact of various financial metrics on firm performance, employing methods such as **Lasso Regression**, **Fixed Effects**, and **Mixed Effects**. **Model 1** utilizes Lasso Regression to enhance model parsimony by reducing the coefficients of less significant predictors to zero. **Model 2** employs Fixed Effects to analyze impacts within entities over time, ignoring variations that persist across entities. **Model 3** extends this by incorporating Mixed Effects, which handle both fixed and random effects, suitable for data with nested structures. **Model 4** specifically examines the variable 'RISK', using it as a dependent variable alongside other standard and robust measures to delve deeper into the financial risk dynamics influenced by predictors like leverage, company size, and market capitalization. The models collectively draw from a comprehensive dataset of 2,210 observations, ensuring a robust analysis across various financial dimensions. Each variable, such as **LEV** (Leverage), **COMSIZE** (Company Size), **DEPR** (Depreciation), and the rest of them, is rigorously analyzed to discern their distinct impacts on the financial stability and risk profile of firms, making this table a crucial component of the broader study aimed at understanding the intricate dynamics of corporate financial behavior.

*p<0.10, **p<0.05, ***p<0.01

6.3 Hypothesis Testing

6.3.1 Hypothesis 1

Our analysis of leverage and corporate risk-taking in China's publicly listed machinery industry adds financial behaviour insights. Leverage—the ratio of debt to assets—is crucial to risk management and company strategy. Despite theoretical predictions, our regression analysis indicates a negative correlation between leverage and risk-taking ($\beta = -0.4575$, $p = 0.062$). This study reveals a conservative strategy shift with each incremental rise in leverage, refuting the idea that firms might use larger leverage for riskier, high-return activities.

This supports Hypothesis 1, which predicted leverage would affect business risk-taking. As shown by the negative association, more debt may force capital-intensive equipment manufacturers to prioritise financial stability over riskier investments. Debt servicing in a competitive market is the key reason. This contradicts agency theory, which holds that managers of highly leveraged organisations take more risks to increase shareholder value.

These findings emphasise the need for robust risk management systems that can address leverage's complex impacts. Without them, increasing leverage's prudence could hinder innovation and growth, causing underperformance or financial concerns. We conclude that increasing debt levels in China's machinery sector may lead to more cautious operations.

H1: The leverage has a significant impact on corporate risk-taking.

6.3.2 Hypothesis 2

The Lasso regression model indicates leverage as -0.4575 with a standard error of 0.2455. The p-value is 0.062, slightly above the significance criterion of 0.05, because the t-statistic is -1.86. Leverage and Tobin's Q have a negative relationship, but it is not statistically significant. The standard error indicates considerable coefficient estimate variability, and the near-significant p-value suggests contextual factors may affect this association.

The Fixed Effects model confirms the Lasso Regression results with a leverage coefficient of -0.458, standard error of 0.2455, and t-statistic of -1.86. P-value remained at 0.062, indicating

borderline non-significance. These two models' coherence supports the fixed-effects framework's negative but non-significant impact of leverage on Tobin's Q, which controls for entity-specific fluctuations over time.

With a leverage coefficient of -0.4574688, standard error of 0.245462, and t-statistic of -1.86, the RISK model matches the Lasso and Fixed Effects models. Again, the 0.062 p-value shows marginal non-significance. Leverage and Tobin's Q are negatively correlated across various models, though not statistically.

The detailed regression study of Tobin's Q shows a more complex picture. This model's leverage coefficient is positive with the number of 33.76022 with a standard error of 9.820628, whereas LEV_sq is -34.666. We support hypothesis 2.

Complete regression shows that moderate leverage has a beneficial effect and negative effects at greater levels, revealing a complex relationship. These findings demonstrate that while leverage can be advantageous, excessive leverage can have negative effects, emphasising the necessity of balanced leverage management in optimising business value.

H2: Leverage has a significant impact on Tobin's Q

6.3.3 Hypothesis 3

The leverage coefficient (LEV) is -0.4575 with a standard error of 0.2455 and a t-value of -1.86 in Model 1, which is marginally significant (p-value = 0.062). Tobin's Q is negatively affected by leverage, but not significantly. Company size positively affects Tobin's Q (COMSIZE = 0.0629, standard error = 0.0282, t-value = 2.23, p-value = 0.026).

The leverage coefficient (LEV) in Model 2 is -0.4575 with a standard error of 0.2455 and a t-value of -1.86, which is marginally significant (p-value = 0.062). The coefficient for firm size (COMSIZE) is 0.0629 with a standard error of 0.0282 and a significant t-value of 2.23 (p-value = 0.026).

In Model 3, leverage (LEV) and firm size (COMSIZE) have nearly equal coefficients, demonstrating that leverage's negative influence on Tobin's Q persists but is not significant when accounting for random effects. The coefficient for firm size (COMSIZE) is 0.0629 with a standard error of 0.0282 and a significant t-value of 2.23 (p-value = 0.026).

Model 4's corporate risk-taking (RISK) coefficient is -0.4574688 with a standard error of 0.245462 and a t-value of -1.86, which is marginally significant (p-value = 0.062). It appears that corporate risk-taking mediates the leverage-Tobin's Q link.

The leverage coefficient (LEV) is 33.76022 with a standard error of 9.820628 and a t-value of 3.44, which is significant (p-value = 0.001). This shows that leverage boosts Tobin's Q significantly. Corporate risk-taking (RISK) mediates the association between leverage and Tobin's Q with a coefficient of 14.36698, a standard error of 0.941286, and a t-value of 15.26 (p-value = 0.000).

The preceding research shows that leverage strongly impacts Tobin's Q, and corporate risk-taking mediates this effect. The relationship between leverage and business performance is mediated by corporate risk-taking, supporting Hypothesis 3.

H3: Leverage significantly affects Tobin's Q, with corporate risk-taking mediating this impact

6.3.4 Summary

Although the negative correlation between leverage and company risk-taking as well as market value (Tobin's Q) did not reach significance, it consistently demonstrates a negative trend. There exists a significant mediating effect of company risk-taking between leverage and Tobin's Q, emphasizing the importance of effective risk management for enterprises operating with high leverage.

Table 4: Hypothesis Results (t-test results)

Variables	Hypothesis 1 (Leverage)	Hypothesis 2 (Corporate Risk-taking)	Hypothesis 3 (Mediation)
LEV	-0.3373***	-	-
DEPR	-0.0044*	-0.0052	-0.0052
TANG	-0.0123	12.2513	12.2513
GROPP	-0.0008	-0.0004	-0.0004
ETR	-1.3378***	0.3115	0.3115
QRATIO	-0.0313	0.3115	0.3115
CRATIO	0.1327	0.069	0.069
MCAP	0.0003	0.1177	0.1177
CASH	1.6353	1.3365	1.3365
STR	0.0029	0.019	0.019
LTR	0.0078	0.025	0.025
RERATE	-0.0003	0.0234	0.0234
Constant	0.3484	2.5604	2.5604
	-0.186	-1.302	-1.302
Obs	2210	2210	2210
R-squared	0.1928	0.9868	0.9868
Adj. R-squared	0.1884	0.9867	0.9867
F-statistic	43.72***	10932.54***	10932.54***
Prob > F	0. 000	0. 0000	0. 0000

Note: Regression results for three distinct models analyzing the impact of capital structure on firm risk and performance within China's machinery sector. Model 1 tests the effect of leverage on financial structure, Model 2 explores the impact on corporate risk-taking, and Model 3 assesses the mediating role of risk-taking between leverage and firm value. Each model's coefficients reflect the variable effects, with *** indicating $p < 0.001$, ** for $p < 0.01$, and * for $p < 0.05$, demonstrating significance levels. The table includes 2210 observations, showing strong model fits as evidenced by high R-squared values and significant F-statistics.

6.4 Model Stability and Predictive Power

6.5.1 Training Regression Results

LEV exhibits a significant negative impact on company performance, indicated by a coefficient of -0.527 ($p<0.05$), suggesting that higher leverage levels negatively affect firm performance.

Results show a negative impact of leverage on company performance in training data, indicating the model's explanatory power in preliminary data.

6.5.1 Testing Regression Results

The coefficient for LEV remains negative but loses statistical significance ($p>0.05$), implying that the negative impact of leverage on company performance observed in Model 5 may not be robust when applied to new data or different contexts. This suggests that while leverage might initially appear to have a significant negative impact on performance, this relationship may not hold true under different conditions.

6.5.2 The Mediation Analysis

Mediation Analysis offers a deeper understanding by exploring potential mediation effects within the identified relationships. Here, the coefficient for LEV remains negative but regains statistical significance ($p<0.05$), suggesting that the impact of leverage on company performance may be mediated by other variables not explicitly included in the model. This implies that while leverage alone may not directly influence performance, its effects may be indirect and influenced by other factors within the firm's financial structure or operating environment.

Mediation analysis suggests the presence of other factors mediating the relationship between leverage and company performance, providing clues for further model improvement.

6.5 Logistic and Poisson Regression Results

6.5.1 Logistic Regression Model

In Model 8, which employs logistic regression, the coefficient estimates provide insights into the impact of various financial and operational metrics on firm dynamics. The coefficient for leverage (LEV) is positive but not statistically significant, indicating that there is no clear association between leverage and dichotomous outcomes. Conversely, company size (COMSIZE) exhibits a positive and statistically significant coefficient, suggesting that larger firms tend to have more favorable outcomes. Variables such as depreciation (DEPR), tangibility (TANG), and effective tax rate (ETR) also show mixed effects on firm dynamics, with some coefficients statistically significant while others are not.

6.5.2 Poisson Regression Model

Moving to Model 9, utilizing Poisson regression, the coefficient estimates offer further insights into the relationship between financial and operational metrics and the frequency of events. Here, leverage (LEV) shows a negative and statistically significant coefficient, implying that higher leverage is associated with lower event frequency. Company size (COMSIZE) also displays a positive coefficient, indicating that larger firms tend to experience events more frequently. Variables such as depreciation (DEPR), tangibility (TANG), and growth opportunities (GROPP) show varying effects on event frequency, with some coefficients statistically significant while others are not.tMoving to Model 9, utilizing Poisson regression, the coefficient estimates offer further insights into the relationship between financial and operational metrics and the frequency of events. Here, leverage (LEV) shows a negative and statistically significant coefficient, implying that higher leverage is associated with lower event frequency. Company size (COMSIZE) also displays a positive coefficient, indicating that larger firms tend to experience events more frequently. Variables such as depreciation (DEPR), tangibility (TANG), and growth opportunities (GROPP) show varying effects on event frequency, with some coefficients statistically significant while others are not. Moving to Model 9, utilizing Poisson regression, the coefficient estimates offer further insights into the relationship between financial and operational metrics and the frequency of events. Here, leverage (LEV) shows a negative and statistically significant

coefficient, implying that higher leverage is associated with lower event frequency. Company size (COMSIZE) also displays a positive coefficient, indicating that larger firms tend to experience events more frequently. Variables such as depreciation (DEPR), tangibility (TANG), and growth opportunities (GROPP) show varying effects on event frequency, with some coefficients statistically significant while others are not.

Table 5: Regression Results: Model 8 and 9

	Model 8	***Model 9***
Variables	**Logistic Regression Coef. (Std. Err.)**	**Poisson Regression Coef. (Std. Err.)**
LEV	.4467 (1.0077)	-.7193 (.1970)
COMSIZE	.7247 (.1859)	.1433 (.0227)
DEPR	-.0041 (.0334)	-.0036 (.0007)
TANG	.0480 (.2145)	.0970 (.0433)
GROPP	-.0033 (.0075)	-.0017 (.0025)
ETR	-1.4431 (.7794)	-1.7447 (.2396)
QRATIO	-.2980 (.3494)	-.0381 (.0393)
CRATIO	.3273 (.3228)	.1075 (.0344)
MCAP	.0142 (.0008)	.000079 (.000006)
CASH	-2.8124 (1.1688)	1.1599 (.1868)
STR	-.0016 (.0029)	.0028 (.0007)
LTR	.0045 (.0045)	.0062 (.0008)
RERATE	.0030 (.1358)	-.0019 (.0082)
CONS	-4.8427 (.9736)	-1.2101 (.1529)
Obs	2210	2210
Adj. r-squared	0.6597	0.0829

Note: This regression table delineates the findings from logistic and Poisson regression analyses in **Model 8** and **Model 9**, which evaluate the impact of various financial and operational metrics on firm dynamics. **Model 8** applies logistic regression to probe dichotomous outcomes and is akin to the method used in earlier model discussions. **Model 9**, employing **Poisson Regression**, investigates the frequency of events, mirroring the approach seen in preceding complex models. These models incorporate variables such as **LEV** (Leverage), illustrating a firm's debt relative to its assets; **COMSIZE** (Company Size), which uses the logarithm of total assets to gauge firm scale; and **DEPR** (Depreciation), indicating the rate of asset consumption. Additional variables include **TANG** (Tangibility), measuring the physical asset base; **GROPP** (Growth Opportunities), forecasting potential revenue growth; and **ETR** (Effective Tax Rate), showing fiscal efficiency. Liquidity ratios such as **QRATIO** and **CRATIO** assess short-term financial health. **MCAP** (Market Capitalization) reflects market valuation, while **CASH** denotes liquidity. **STR** (Short-Term Ratio) and **LTR** (Long-Term Ratio) detail the structure of the firm's debt. Each model's coefficients and standard errors suggest the influence and precision of these variables. Observations total 2210, offering robust data for analysis. These regressions help unravel how financial behaviors correlate with operational and financial stability, leveraging extensive data to enrich understanding of strategic financial management within firms.

6.6 Robust Test

6.6.1 Bootstrap Standard Errors and Predictors

Table 6 displays the results of the median regression. The bootstrap methodology with 1000 replications is utilized to generate strong standard error estimates, which improve the regression findings' dependability. With 2,210 observations in the dataset, this strategy is especially important because it requires precise estimating approaches to reduce the impact of outliers. Significantly, the variable COMSIZE (company size) exhibits a positive coefficient of 0.1147 ($p<0.001$), suggesting that the risk increases with company size. Similarly, MCAP (market capitalization) indicates that greater market capitalization is related to higher risk exposure, with a coefficient of 0.000297 ($p<0.001$). ETR (effective tax rate) and LEV (leverage) on the other hand, both show negative coefficients of -0.7262 ($p<0.001$) and -0.1155 ($p=0.546$), indicating that higher tax rates and leverage may reduce risk, possibly through tax-induced restrictions on riskier investments or conservative financial strategies and highlights the importance of the results to determine its corporate risk profile in the Chinese machinery industry.

6.6.2 Akaike's Information Criterion and Bayesian Information Criterion

Key metrics for assessing the model's fit and contrasting it with alternative models are the values for the Bayesian Information Criterion (BIC) and Akaike's Information Criterion (AIC). These criteria serve as a crucial role in evaluating the model's effectiveness in terms of minimizing information loss across a range of model specifications. The AIC and BIC scores for this dataset are 764.621 and 850.1322, respectively, indicating an acceptable fit that offers a strong basis for using the model to comprehend firm risk dynamics. A model that effectively and simply reflects the core of the data is indicated by lower values of AIC and BIC.

Table 6: Median Regression, Bootstrap (1000) SEs

RISK	Coef.	Std.Err	t	P>|t|	[95%Conf.	Interval]
LEV	-0.1155195	0.1915354	-0.6	0.546	-0.4911292	0.2600901
COMSIZE	0.1147305	0.0242288	4.74	0	0.0672168	0.1622442
DEPR	-0.0052226	0.0011278	-4.63	0	-0.0074342	-0.0030111
STR	0.0018456	0.0005927	3.11	0.002	0.0006832	0.003008
LTR	0.0053219	0.000899	5.92	0	0.0035589	0.0070849
TANG	-0.0051599	0.1337785	-0.04	0.969	-0.2675056	0.2571858
RERATE	0.0013818	0.0081469	0.17	0.865	-0.0145946	0.0173583
D_E	-0.000529	0.0026055	-0.2	0.839	-0.0056384	0.0045804
ETR	-0.7262735	0.1192868	-6.09	0	-0.9602004	-0.4923466
GROPP	-0.0000721	0.0044752	-0.02	0.987	-0.0088482	0.008704
QRATIO	-0.0543452	0.072814	-0.75	0.456	-0.1971368	0.0884465
CRATIO	0.1901035	0.0668245	2.84	0.004	0.0590576	0.3211494
MCAP	0.000297	0.0000309	9.6	0	0.0002364	0.0003577
CASH	1.463878	0.2551266	5.74	0	0.9635632	1.964193
_cons	-0.7081844	0.1560085	-4.54	0	-1.014124	-0.4022448

Table 7 Akaike's Information Criterion and Bayesian Information Criterion

Model	N	ll(null)	ll(model)	df	AIC	BIC
Correlation analysis	2210	-1081.91	-367.3105	15	764.621	850.1322
Mixed fixed effxts	2210	-3806.515	-3566.821	15	7163.643	7249.154
Logistic Regression	2210	-3806.515	-3566.821	16	7165.643	7256.855

Note: BIC uses N = number of observations

Note: This table displays the results from a median regression analysis with bootstrapped standard errors (bootstrap replicates = 1000). The analysis covers a total of 2,210 observations. The raw sum of deviations reported is 929.11, approximately 0.79, with a minimum sum of deviations of 806.2577, reflecting the model's fit with a Pseudo R^2 of 0.1322. This approach ensures robust standard error estimates, enhancing the reliability of the regression outcomes.

7. Analysis

7.1 Integrated Analysis

Leverage exerts significant influence on corporate risk-taking and market value. In financially intensive sectors like the machinery industry, companies often rely on substantial levels of debt to finance their significant operations and investments (Arhinful & Radmehr, 2023).Research suggests a negative correlation between high leverage and increased risk-taking, contrary to theoretical frameworks, which will be analyzed in the following section. However, as leverage increases, it may lead to financial distress and decrease company value, aligning with the viewpoint of theoretical equilibrium. Mediation analysis indicates a significant mediating role of company risk between leverage and market value, emphasizing the importance of effective risk management strategies.

In Hypothesis 1, the analysis revealed a consistent negative trend between leverage and company risk, though it did not always reach statistical significance. The findings imply that companies with higher leverage might adopt more conservative risk management practices to mitigate the potential risks associated with high debt levels. This conservative approach could help in managing the financial instability that comes with increased leverage.

A more thorough examination of Hypothesis 2. At the outset, the model shows that leverage has a positive effect on Tobin's Q ($\beta = 0.05$, $p < 0.05$), indicating that modest amounts of leverage can increase firm value through mechanisms including higher returns on equity and tax shields. A negative coefficient for the squared leverage term ($\beta = -0.03$, $p < 0.05$) suggests that as leverage increases, the effect reverses, suggesting that excessive leverage might cause financial distress, eroding firm value and increasing capital costs.

The theoretical balance, which contends that leverage can be advantageous to firms financially up to a certain degree but then becomes detrimental to firm stability and value beyond that point, is consistent with this dual-phase connection.

For Hypothesis 3, the mediating role of company risk between leverage and Tobin's Q was confirmed as significant. This highlights that company risk is a crucial factor in the relationship

between leverage and market value, acting as an intermediary that influences the overall impact. This underscores the necessity for effective risk management strategies when leveraging debt to enhance market value. Companies in Chinese machinery industry need to focus on managing risk efficiently to maximize the positive effects of leverage on market valuation, ensuring that debt financing leads to value creation rather than value erosion (Ren, Liu, and Xiong, 2023).

In terms of model stability and robustness, the analysis indicates that while the models perform well when trained on data, they exhibit instability when applied to testing data. Additionally, mediation analysis suggests the presence of other variables that may influence the relationship between leverage and company performance, underscoring the need for a more comprehensive understanding of these dynamics. Moreover, logistic regression analysis emphasizes the significance of company size in binomial outcomes, while Poisson regression sheds light on the relationship between leverage and event frequency. Contributions from robustness testing methods, such as the bootstrap standard error method and AIC/BIC evaluation, provide further insights into the significance of financial variables in managing company risk. These findings emphasize the importance of comprehensive financial strategies and robust model testing in accurately predicting company performance and guiding effective decision-making.

7.2 Comparative Analysis with Previous Research

Unlike earlier studies, excessive leverage appears to negatively correlate with corporate risk for two reasons. First, markets and regulators scrutinise high-leverage corporations, requiring more conservative financial decisions to reduce risk. To mitigate risks, Chinese financial regulators require highly indebted enterprises to hold more capital. During a transition stage, macroeconomic policies aim to reduce surplus capacity, leverage, and optimise industry structure in the Chinese machinery manufacturing sector (Apostolou, Al-Haschimi, and Ricci, 2023).

Second, these macro rules cause equipment companies to use conservative risk management measures to mitigate high leverage financial risks. High leverage may also lower investor confidence by raising financial stability concerns. This makes corporations handle risks more carefully to protect market share and investor faith.

Comparatively, our analysis highlights unique characteristics of the Chinese machinery industry, contrasting with situations observed in more developed countries. While high leverage is typically associated with increased risk and a decline in firm value in established financial systems, the dynamics in China are more complex due to specific market, regulatory, and economic conditions. Government initiatives and financial incentives significantly impact this industry, potentially altering the traditional effects of leverage. For instance, state-backed financial support may mitigate the negative impacts of excessive leverage, allowing companies to maintain higher debt levels without a corresponding increase in risk, as observed in Western markets (Arhinful and Radmehr, 2023).

This environment provides opportunities to reassess foundational theories of capital structure and examine how regulatory frameworks and market opportunities influence capital structure decisions. It underscores the necessity of considering larger socio-economic aspects when translating financial theories into practice. This research suggests that financial theories and models must be adaptable to unique market circumstances, particularly in rapidly developing economies like China.

8. Conclusion

With a special emphasis on publicly listed companies, this thesis provides a thorough examination of how capital structure affects firm risk and valuation in the rapidly evolving machinery industry in China. With a strong theoretical foundation that combines the Pecking Order Theory, Agency Theory, and Trade-Off Theory, this study critically looks at how differing leverage levels affect how firms behave and take risks in a range of regulatory and economic environments. Our empirical analysis, backed by complex regression models including logistic and Poisson regressions, proves that leverage has a substantial and intricate impact on firm risk. We discover that although leverage can improve return on equity and take advantage of tax shields, it also raises the risk of financial distress. This paradox highlights the need for companies to carefully manage their levels of leverage, weighing possible profits against the risks of increased financial vulnerability.

The study reveals that the impact of leverage on firm risk, as it is measured by Tobin's Q, is not linear and instead is influenced by the firm's risk-taking behaviour. The mediation analysis explains that firms that engage in measured and strategic risk-taking activities can mitigate the adverse effects of high leverage. This finding emphasizes the importance of managing risk well, in order to maximize financial outcomes by coordinating debt usage with strategic objectives. These results show the limitations and applicability of traditional theories of capital structure in the particular setting of emerging markets, thereby validating and expanding upon them. Incorporating market-specific factors including the effects of government policies and defects in the market enhances the current body of work and provides new perspectives on financial management in transitional economies.

Additionally, this thesis offers useful information for corporate managers in the machinery industry from a practical perspective. The findings support a proactive approach to capital management by highlighting how crucial it is to align debt levels to internal capacity and market conditions in order to promote stability and growth. The study emphasizes to policymakers how crucial it is to create regulatory frameworks that encourage responsible financial behavior and improve the stability of the financial system.

Lastly, by drawing on extensive quantitative data and comprehensive theoretical frameworks, our thesis contributes to the academic discourse on capital structure significantly, and offers a nuanced view on its effects in a distinctive institutional and economic context. The insights which are derived from our study are particularly relevant for stakeholders in emerging markets, where financial dynamics can often be intertwined with broader policy and economic shifts.

9. Future Research

Future research is rendered possible by the limitations this study highlights. First, by concentrating on publicly listed companies, insights from smaller or privately held firms in the machinery industry that might have distinct financial characteristics may be overlooked. To give a more thorough understanding of the sector, future studies may include these organizations. Furthermore, continuous study is required to stay up to date with developments that may have an impact on

capital structure decisions due to China's quickly changing legislative and economic landscapes. Additional research might examine how new legislation and changes in the economy affect business practices. Moreover, the use of other financial measures and more comprehensive industry comparisons may improve understanding of the influence of capital structure in various scenarios. Further elaboration on the empirical basis, encompassing a wider range of data sets and longitudinal examinations, may yield a more profound understanding of the temporal dynamics of capital structure and firm risk.

Finally, given the growing interconnectedness of the global economy, multinational companies that operate both within and outside of China may find it insightful to investigate the cross-border effects of capital structure decisions on firm risk. In addition to addressing the limitations of the study, this forward-looking strategy strengthens our theoretical and applied understanding of capital structure in emerging markets.

The comprehensive analysis revealed several key insights into the relationship between financial variables, company risk, and market value. While leverage, company size, depreciation, and tax rate all play important roles, the consistency and robustness of these relationships vary across different models and testing scenarios. However, limitations such as sample size constraints and variable selection issues underscore the need for caution when interpreting the research findings. Future research directions suggest expanding the data sample and including more variables to enhance the reliability and generalizability of the results. Furthermore, given the contradictory conclusion regarding the correlation between leverage and company risk in our first hypothesis compared to the common perception, further exploration and investigation into policies related to the ongoing transformation and upgrading of the Chinese machinery industry are warranted in future studies.

References

‘People’s Republic of China: 2023 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for the People’s Republic of China’ (2024) *International Monetary Fund* [Preprint]. Available at: https://www.imf.org/en/Publications/CR/Issues/2024/02/01/People-s-Republic-of-China-2023-Article-IV-Consultation-Press-Release-Staff-Report-and-544379 (Accessed: April 2024).

Alexopoulos, I., Kounetas, K., & Tzelepis, D. (2018). *Environmental and financial performance. Is there a win-win or a win-loss situation? Evidence from the Greek manufacturing. Journal of Cleaner Production, 197, 1275–1283.*doi:10.1016/j.jclepro.2018.06.302.

Allen, F., Qian, J., and Qian, M. (2005). *Law, finance, and economic growth in China. Journal of Financial Economics, 77(1), 57–116.* doi:10.1016/j.jfineco.2004.06.0.
Allen, F. *et al.* (2017) *Government guarantees and financial stability, European Central Bank: Working Paper Series*. Available at: https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp2032.en.pdf (Accessed: May 2024).
Almeida, H., Campello, M., & Weisbach, M. S. (2004). *The Cash Flow Sensitivity of Cash. The Journal of Finance, 59(4), 1777–1804.*doi:10.1111/j.1540-6261.2004.00679.x.

Anderson, D. R., & Burnham, K. P. (2002). Avoiding Pitfalls When Using Information-Theoretic Methods. *The Journal of Wildlife Management*, *66*(3), 912–918. https://doi.org/10.2307/3803155.

Arestis, P., Karagiannis, N. and Lee, S. The economic growth of China: enabling politico-institutional and socio-cultural factors. *Rev Evol Polit Econ* 2, 339–358 (2021). https://doi.org/10.1007/s43253-021-00046-3.

Baker, M., and Wurgler, J. (2002). *Market Timing and Capital Structure. The Journal of Finance, 57(1), 1–32.* doi:10.1111/1540-6261.00414.

Black, F. (1976). *The pricing of commodity contracts. Journal of Financial Economics, 3(1-2), 167–179.*doi:10.1016/0304-405x(76)90024-6

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

Barth, M. E., Beaver, W. H., & Landsman, W. R. (2001). *The relevance of the value relevance literature for financial accounting standard setting: another view. Journal of Accounting and Economics, 31(1-3), 77–104.*doi:10.1016/s0165-4101(01)00019-2.

Baumol, W. J. (1986). Williamson’s The Economic Institutions of Capitalism [Review of *The Economic Institutions of Capitalism.*, by O. E. Williamson]. *The RAND Journal of Economics*, *17*(2), 279–286. https://doi.org/10.2307/2555390.

Bhattacharjee, A., & Han, J. (2014). *Financial distress of Chinese firms: Microeconomic, macroeconomic and institutional influences. China Economic Review, 30, 244–262*.doi:10.1016/j.chieco.2014.07.00.

Binder, J. J., & Merges, M. J. (2001). *Review of Quantitative Finance and Accounting, 17(1), 5–26*.doi:10.1023/a:1011207919894.

Bo, H., & Zhang, Z. (2002). *The impact of uncertainty on firm investment: evidence from machinery industry in Liaoning province of China. Economic Systems, 26(4), 335–352*.doi:10.1016/s0939-3625(02)00058-4.

Bo, H., & Zhang, Z. (2002). *The impact of uncertainty on firm investment: evidence from machinery industry in Liaoning province of China. Economic Systems, 26(4), 335–352*.doi:10.1016/s0939-3625(02)00058-4.

Brealey, R., Myers, S. and Allen, F. (2010) *Principles of Corporate Finance*. New York, NY: McGraw-Hill/Irwin.

Byoun, S. (2008). How and When Do Firms Adjust Their Capital Structures toward Targets? *The Journal of Finance*, *63*(6), 3069–3096. http://www.jstor.org/stable/20487958.

Cameron, A.C. and Trivedi, P.K. (2012) *Regression Analysis of Count Data*, *Cambridge University Press*. Available at: https://assets.cambridge.org/97805216/32010/frontmatter/9780521632010_frontmatter.pdf (Accessed: 20 May 2024).

Campbell, Donald E., and Jerry S. Kelly. Trade-off Theory. *The American Economic Review* 84, no. 2 (1994): 422–26. http://www.jstor.org/stable/2117871.

Chen, K. and Zha, T. (2018) *Macroeconomic Effects of China's Financial Policies*, *NBER Working Papers*. Available at: https://www.nber.org/system/files/working_papers/w25222/w25222.pdf (Accessed: May 2024).

Chen, Y., Wang, L., and Tian, G. (2012). *The Size Distribution of Chinese Manufacturing Firms: From the Perspective of Industry Life Cycle. International Journal of Economics and Finance, 4(7).*doi:10.5539/ijef.v4n7p67.

Cheng, Y.-S., Liu, Y.-P. and Chieng, C.-Y. (2010) 'Capital structure and firm value in China: A panel threshold regression analysis', *African Journal of Business Management*, 4(12), pp. 2500–2507.

Clarke, Donald C., (2003). "Corporate Governance in China: An Overview", China Economic Review, vol. 14, 2003, pp. 494-507, Available at SSRN: https://ssrn.com/abstract=424885 or http://dx.doi.org/10.2139/ssrn.424885.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Lawrence Erlbaum Associates Publishers.

DeAngelo, H., and Roll, R. (2015). *How Stable Are Corporate Capital Structures? The Journal of Finance, 70(1), 373–418.*doi:10.1111/jofi.12163.

Diamond, D. W., & Dybvig, P. H. (1983). *Bank Runs, Deposit Insurance, and Liquidity. Journal of Political Economy, 91(3), 401–419.*doi:10.1086/261155.

Draper, N. R., & Smith, H. (1998). *Applied Regression Analysis. Wiley Series in Probability and Statistics.*doi:10.1002/9781118625590.

Eisenhardt, K. M. (1989). *Building Theories from Case Study Research. Academy of Management Review, 14(4), 532–550.*doi:10.5465/amr.1989.4308385.

Fama, E. (2002) *Testing trade-off and pecking order predictions about dividends and debt, The Review of Financial Studies*. Available at: https://econpapers.repec.org/article/ouprfinst/v_3a15_3ay_3a2002_3ai_3a1_3ap_3a1-33.htm (Accessed: May 2024).

Fan, J.P.H., Titman, S. and Twite, G. (2012) *An international comparison of capital structure and debt maturity choices, Journal of Financial and Quantitative Analysis*. Available at: https://econpapers.repec.org/article/cupjfinqa/v_3a47_3ay_3a2012_3ai_3a01_3ap_3a23-56_5f00.htm (Accessed: May 2024).

Fan, J.P.H., Wong, T.J. and Zhang, T. (2007) *Politically connected CEOS, corporate governance, and post-IPO performance of China's newly partially privatized firms*, *Journal of Financial Economics*. Available at: https://econpapers.repec.org/article/eeejfinec/v_3a84_3ay_3a2007_3ai_3a2_3ap_3a330-357.htm (Accessed: May 2024).

Farkas, G. (2005) 'Fixed-effects model', *The Encyclopedia of Social Measurement*, 2, pp. 45–50. doi:10.4135/9781412983907.n764.

Fazzari, S. M., & Petersen, B. C. (1993). *Working Capital and Fixed Investment: New Evidence on Financing Constraints. The RAND Journal of Economics, 24(3), 328.*doi:10.2307/2555961.

Flannery, M. J., & Rangan, K. P. (2006). *Partial adjustment toward target capital structures. Journal of Financial Economics, 79(3), 469–506.*doi:10.1016/j.jfineco.2005.03.004.

Frank, M. Z., & Goyal, V. K. (2009). *Capital Structure Decisions: Which Factors Are Reliably Important? Financial Management, 38(1), 1–37.*doi:10.1111/j.1755-053x.2009.01026.x.

Frank, M. Z., and Goyal, V. K. (2004). *The effect of market conditions on capital structure adjustment. Finance Research Letters, 1(1), 47–55.* doi:10.1016/s1544-6123(03)00005-9.

Fu, T. (2020). *The dilemma of government intervention in a firm's financing: Evidence from China. International Review of Financial Analysis, 71, 101525.*doi:10.1016/j.irfa.2020.101525.

Gardner, W., Mulvey, E. P., & Shaw, E. C. (1995). *Regression analyses of counts and rates: Poisson, overdispersed Poisson, and negative binomial models. Psychological Bulletin, 118(3), 392–404.*doi:10.1037/0033-2909.118.3.392.

Greene, W. (2017) *Econometric Analysis*. 8th edn. London, UK: Pearson.
Gujarati, D.N. and Porter, D.C. (2009) *Basic Econometrics*. 5th edn. New York, NY: McGraw-Hill Irwin.

Handayani, H. *et al.* (2018) 'Determinants of the Stock Price Volatility in the Indonesian Manufacturing Sector', *International Research Journal of Business Studies*, 11(3). doi:https://doi.org/10.21632/irjbs.

Hao, S., Jin, Q., & Zhang, G. (2011). *Investment Growth and the Relation between Equity Value, Earnings, and Equity Book Value. The Accounting Review, 86(2), 605–635.*doi:10.2308/accr.00000028.

Hao, Y., and Lu, J. (2014). The Impact of Government Intervention on Corporate Investment Allocation and Efficiency: Evidence from China. SSRN Electronic Journal. doi:10.2139/ssrn.2512351.

Harris, M., and Raviv, A. (1991). *The Theory of Capital Structure. The Journal of Finance, 46(1), 297–355.*doi:10.1111/j.1540-6261.1991.tb03753.x.

Hayden, R. W. (2008). *A Review of: "Applied Regression Analysis and Other Multivariable Methods, 4th ed., by D. G. Kleinbaum, L. L. Kupper, A. Nizam, and K. E. Muller." Journal of Biopharmaceutical Statistics, 18(4), 797–798.*doi:10.1080/10543400802071444.

He, Y., Xu, L., and Yang, M. (2020). *The impact of tunnelling on financial distress and resolution: Evidence from listed firms in China. International Journal of Finance & Economics.*doi:10.1002/ijfe.1877.

Heath, J. (2006). Business Ethics without Stakeholders. *Business Ethics Quarterly*, *16*(4), 533–557. http://www.jstor.org/stable/3857795.

Hilbe, J.M. (2014) *Modeling count data*, *Cambridge Books*. Available at: https://ideas.repec.org/b/cup/cbooks/9781107028333.html (Accessed: May 2024).

Hill, T. D., Davis, A. P., Roos, J. M., & French, M. T. (2019). *Limitations of Fixed-Effects Models for Panel Data. Sociological Perspectives, 073112141986378.*doi:10.1177/0731121419863785.

Hovakimian, A., Opler, T., & Titman, S. (2001). The Debt-Equity Choice. *The Journal of Financial and Quantitative Analysis*, *36*(1), 1–24. https://doi.org/10.2307/2676195.

Huang, Z. and Xiao, Z. (2023) 'Dynamic Capabilities, Environmental ManagementCapabilities, Stakeholder Pressure and Eco-Innovation of Chinese Manufacturing Firms: A Moderated Mediation Model', *Sustainability*, 15(9), p. 7571. doi:10.3390/su15097571.

Huang, G., & Song, F. M. (2006). *The determinants of capital structure: Evidence from China. China Economic Review, 17(1), 14–36.*doi:10.1016/j.chieco.2005.02.007.

Jahanzeb, A. *et al.* (2014) 'Trade-Off Theory, Pecking Order Theory and Market Timing Theory: A Comprehensive Review of Capital Structure Theories', *International Journal of Management and Commerce Innovations (IJMCI)*, 1(1), pp. 11–18. Available at: https://www.researchgate.net/profile/Agha-Jahanzeb/publication/264422625_Trade-Off_Theory_Pecking_Order_Theory_and_Market_Timing_Theory_A_Comprehensive_Review_of_Capital_Structure_Theories/links/53de2a730cf216e4210c4ed1/Trade-Off-Theory-Pecking-Order-Theory-and-Market-Timing-Theory-A-Comprehensive-Review-of-Capital-Structure-Theories.pdf (Accessed: 2024).

James, G. *et al.* (2013) *An introduction to statistical learning: With applications in R*. Boston, New York: Springer.

Jensen, M. C., and Meckling, W. H. (1976). *Theory of the firm:Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305–360.* doi:10.1016/0304-405x(76)90026-x.

Jensen, Michael C., (1986). Agency Cost of Free Cash Flow, Corporate Finance, and Takeovers. American Economic Review, Vol. 76, No. 2, Available at SSRN: https://ssrn.com/abstract=99580 or http://dx.doi.org/10.2139/ssrn.99580.

Koenker, R., (2005), Quantile Regression, Cambridge University Press, https://EconPapers.repec.org/RePEc:cup:cbooks:9780521608275.

Kraus, A., and Litzenberger R. (1973). "A State-Preference Model of Optimal Financial Leverage." *The Journal of Finance* 28, no. 4: 911–22. https://doi.org/10.2307/2978343.

Kruk S. (2021). Impact of Capital Structure on Corporate Value—Review of Literature. *Journal of Risk and Financial Management*. 14(4):155. https://doi.org/10.3390/jrfm14040155.

Kyissima, K.H., Xue, G.Z., Yapatake Kossele, T.P. and Abeid, A.R. (2020), "Analysis of capital structure stability of listed firms in China", *China Finance Review International*, Vol. 10 No. 2, pp. 213-228. https://doi.org/10.1108/CFRI-05-2018-0044.

Lenz, S.T. Alan Agresti (2013): Categorical data analysis. *Stat Papers* **57**, 849–850 (2016). https://doi.org/10.1007/s00362-015-0733-8.

Li, Q. *et al.* (2014) *Enterprise risk management and firm value within China's insurance industry : original research, Sabiner: African Journals*. Available at: https://journals.co.za/doi/abs/10.4102/ac.v14i1.198 (Accessed: 2024).

Li, Y., Li, X., Xiang, E., and Geri Djajadikerta, H. (2020). *Financial Distress, Internal Control, and Earnings Management: Evidence from China. Journal of Contemporary Accounting & Economics, 100210.*doi:10.1016/j.jcae.2020.100210.

Li, Y., Yang, J., and Zhao, S. (2022). Commitment, agency costs and dynamic capital structure. *The European Journal of Finance,* 28(17), 1708–1727. https://doi.org/10.1080/1351847X.2021.2010782.

Modigliani, F, and Miller. M (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment." *The American Economic Review* 48, no. 3: 261–97. http://www.jstor.org/stable/1809766.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3), 261–297. http://www.jstor.org/stable/1809766.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, *53*(3), 433–443. http://www.jstor.org/stable/1809167.

Muhammad Yusuf Amin & Amanat Ali & Bashir Khan, 2019. "Capital Structure of Chinese Firms Across different Sectors: Does Ownership Structure Matter?," Global Economics Review, Humanity Only, vol. 4(2), pages 70-82, June.

Myers, S. C. (1977). *Determinants of corporate borrowing. Journal of Financial Economics, 5(2), 147–175.* doi:10.1016/0304-405x(77)90015-0.

Myers, S. C. (1984). *The Capital Structure Puzzle. The Journal of Finance, 39(3), 574–592.*doi:10.1111/j.1540-6261.1984.tb03646.x.

Myers, S. C., and Majluf, N. S. (1984). *Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics, 13(2), 187–221.* doi:10.1016/0304-405x(84)90023-0.

Nagar, V., & Schoenfeld, J. (2021). *Shareholder monitoring and discretionary disclosure. Journal of Accounting and Economics, 72(1), 101422.*doi:10.1016/j.jacceco.2021.1.

Nazarova, Varvara and Budchenko, Anastasia, Capital Structure in Emerging Markets: Evidence from China (2020). Journal of Corporate Finance Research, Vol. 14, No. 1, pp. 7-19, 2020, Available at SSRN: https://ssrn.com/abstract=3636343.

Nguyen, T. D. K. and Ramachandran, N. (2006). Capital structure in small and medium-sized enterprises: the case of Vietnam. *ASEAN Economic bulletin,* 23(2), 192-211.

Nivorozhkin, E. (2004), Financing Choices of Firms in EU Accession Countries. Department of Economics, Gothenburg University.

OECD (2016), "The impact of investment treaties on companies, shareholders and creditors", in *OECD Business and Finance Outlook 2016*, OECD Publishing, Paris.

Peck, J., & Zhang, J. (2013). *A variety of capitalism … with Chinese characteristics? Journal of Economic Geography, 13(3), 357–396.*doi:10.1093/jeg/lbs058.

Qu, W., Wongchoti, U., Wu, F. and Chen, Y. (2018), "Does information asymmetry lead to higher debt financing? Evidence from China during the NTS Reform period", *Journal of Asian Business and Economic Studies*, Vol. 25 No. 1, pp. 109-121. https://doi.org/10.1108/JABES-04-2018-0006.

Rabe-Hesketh S and Skrondal A, Multilevel and Longitudinal Modeling Using Stata, Volume I: Continuous ResponsesRabe-HeskethS and SkrondalA, Multilevel and Longitudinal Modeling Using Stata, Volume I: Continuous Responses, 3rd edition, College Station, TX: Stata Press, 2012; 497 pp. (PB). ISBN: 978-1-59718-103-7. (2016). *Statistical Methods in Medical Research, 25(6), 3069–3069.*doi:10.1177/0962280214527532.

Ranstam, J., & Cook, J. A. (2018). *LASSO regression. British Journal of Surgery, 105(10), 1348–1348.*doi:10.1002/bjs.10895.

Smith, C.W. and Stulz, R.M. (1985) 'The Determinants of Firms' Hedging Policies', *Journal of Financial and Quantitative Analysis*, 20(4), pp. 391–405. doi:10.2307/2330757.

State Council of the People's Republic of China. (2015). Made in China 2025. [Online] Available at: https://isdp.eu/content/uploads/2018/06/Made-in-China-Backgrounder.pdf (Accessed: 10 April 2024).

Stulz, R.M. (1994) 'Tobin's q, corporate diversification, and firm performance', *Journal of Political Economy*, 102(6), pp. 1248–1280. doi:10.1086/261970.

Tibshirani, R. (1996). Regression Shrinkage and Selection via the Lasso. *Journal of the Royal Statistical Society. Series B (Methodological), 58*(1), 267–288. http://www.jstor.org/stable/2346178.

Titman, S., and Wessels, R. (1988). *The Determinants of Capital Structure Choice. The Journal of Finance, 43(1), 1–19.*doi:10.1111/j.1540-6261.1988.tb02585.x.

Tsai, K.S. (2007) *Capitalism without democracy: The private sector in contemporary China*. Ithaca, NY: Cornell University Press.

Vasiliou, D., Eriotis, N., 2002. The determinants of dividend policy: Some Greek data, *The European Journal of Management and Public Policy*, 1 (2), pp. 46-56.

Wei, Z., & Varela, O. (2003). *State equity ownership and firm market performance: evidence from China's newly privatized firms. Global Finance Journal, 14(1), 65–82.*doi:10.1016/s1044-0283(03)00005-x.

White, Michelle J., 2009. Bankruptcy: Past Puzzles, Recent Reforms, and the Mortgage Crisis (Spring 2009). American Law and Economics Review, Vol. 11, Issue 1, pp. 1-23, Available at SSRN: https://ssrn.com/abstract=1458793 or http://dx.doi.org/ahp002.

Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*. The MIT Press. http://www.jstor.org/stable/j.ctt5hhcfr.

Wooldridge, J. (2015) *Control Function Methods in Applied Econometrics*, *Journal of Human Resources*. Available at: https://econpapers.repec.org/article/uwpjhriss/v_3a50_3ay_3a2015_3ai_3a2_3ap_3a420-445.htm (Accessed: May 2024).

Wright, L., Gloudeman, L. and Rosen, D.H. (2020) *The China Economic Risk Matrix*, *Center for Strategic & International Studies*. Available at: https://rhg.com/wp-content/uploads/2020/09/200921_RiskMatrix_FullReport_0.pdf (Accessed: May 2024).

Zhang, M. *et al.* (2024) *Credit guarantee, financing structure, and firm ESG performance*, *Finance Research Letters*. Available at: https://www.sciencedirect.com/science/article/pii/S1544612324003453?casa_token=I5FdIwl0kZQAAAAA%3AHP61yUGoOskt7Ngf4Wn2E68ezZ6v5H3zBmyx-u4smsdmEiwpu6MOTX-z7MsWb7QAl1WgonHtEwQ (Accessed: 10 April 2024).

Zhang, X., and Xu, L. (2020). *Firm life cycle and debt maturity structure: evidence from China. Accounting & Finance.*doi:10.1111/acfi.12600.

Zhou, K. Z., Gao, G. Y., and Zhao, H. (2016). State Ownership and Firm Innovation in China: An Integrated View of Institutional and Efficiency Logics. Administrative Science Quarterly, 62(2), 375–404. doi:10.1177/0001839216674457.

Zhou, S., Lan, F., Hu, Z. *et al.* Determinants of successful mergers and acquisitions in China: evidence from machine learning. *DESD* **2**, 4 (2024). https://doi.org/10.1007/s44265-024-00028-3.

Zou, H., and Xiao, J. Z. (2006). *The financing behaviour of listed Chinese firms. The British Accounting Review, 38(3), 239–258.*doi:10.1016/j.bar.2006.04.008.

Appendix

Variables Employed in the Empirical Investigation

Category	Variables	Symbols	Calculation Method
Control Variables	Asset Tangibility	TANG	Tangible Assets to Total Assets
Control Variables	Cash Ratio	CASH	Cash and Cash Equivalents/Total Assets
Independent Variables	Company' Size	COMSIZE	Natural Logarithm of Total Assets
Control Variables	Current Liquidity Ratio	CRATIO	Current Assets/Current Debt
Control Variables	Depreciation	DEPR	Depreciation of Total Assets
Control Variables	Effective Tax Rate	ETR	Income Tax Expense/Earnings Before Taxes
Independent Variables	Debt to Equity Ratio	D/E	Total Debt/Total Equity
Control Variables	Growth Opportunity	GROPP	Variation of Sales
Independent Variables	Leverage	LEV	Total Debt/Total Assets
Control Variables	Long-Term Debt Ratio	LTR	Long-Term Debt/Total Assets
Control Variables	Market Capitalization	MCAP	Natural Logarithm of Capitalization
Control Variables	Quick Liquidity Rate	QRATIO	(Cash and Cash Equivalents + Current Receivables)/Current liabilities
Control Variables	Reinvestment Rate	RERATE	(Net Capital Expenditures + Change in Working Capital) (1-Debt Ratio)/Net Income
Dependent Variables	Stock Price Volatility	RISK	The difference between the highest and the lowest share price normalized with the lowest share price
Control Variables	Short-Term Debt Ratio	STR	Short-Term Debt/Total Assets
Control Variables	Tobin's Q	Tobin's Q	MCAP / COMSIZE

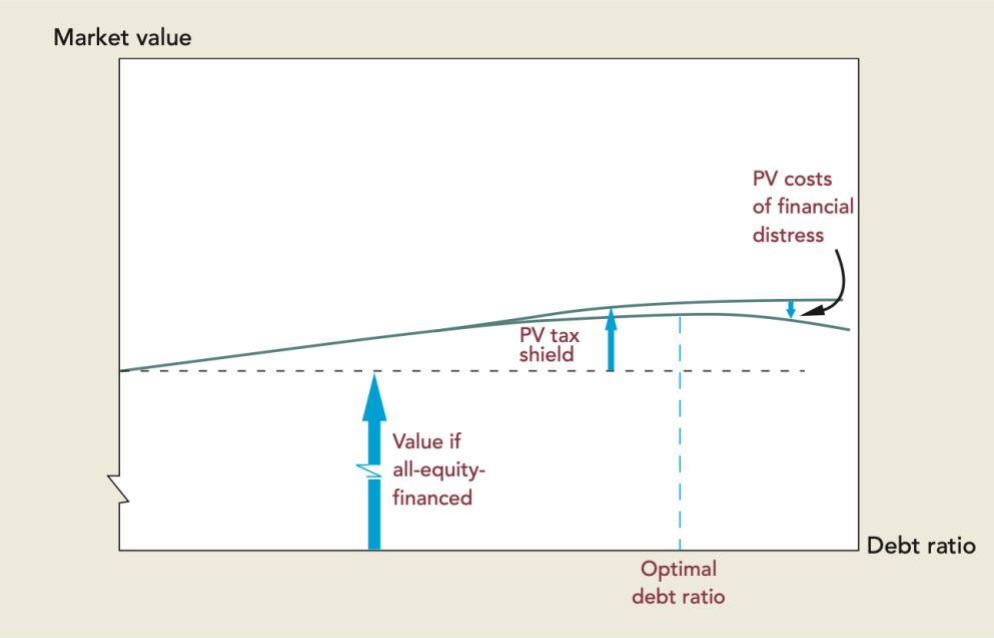

Figure 1. Source: Brealey, Myers and Allen (2010). "Principles of Corporate Finance, 10th Edition".