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Navigating Market Distress: The Role of Information Asymmetry in Capital Structure Decisions

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A study of how different indicators of information asymmetry impact the capital structure decision of firms during market distress

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Abstract

This paper aims to uncover how stock liquidity and analyst coverage, as indicators of information asymmetry, influence the capital structure decisions of companies during market distress, such as the recent COVID-19 pandemic. This assumption is mainly based on the theoretical framework of Pecking Order theory (Myers & Majluf, 1984) and previous empirical research on capital structure and information asymmetry. The study uses a longitudinal quantitative approach and analyzes a sample of 305 U.S. firms from 2017 to 2023 extracted from LSEG Eikon's database.

Multiple regression models tested the derived hypotheses. The results show that stock liquidity and analyst coverage, as indicators of information asymmetry, do not significantly impact capital structure decisions during the market distress triggered by COVID-19, suggesting that other considerations, such as industry-specific factors and government intervention, may be influential during this period. These results challenge previous research on information asymmetry's impact on capital structure during market distress, indicating a need for further research. Future studies should employ more robust statistical techniques and consider a broader range of variables and contexts. This research contributes to the existing literature by providing new insights into the complexities of financial decision-making during crises, emphasizing the importance of considering broader economic and regulatory environments.

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1.0 Introduction

This section introduces a background to capital structure and its mechanisms. It then problematizes the subjects and presents research gaps in the area presented based on existing empirical research. Leading up to the purpose of this study and the research question, this paper explains the study's limitations and presents its outline.

1.1 Background

The study of capital structure is about understanding the mix of debt and equity that a company uses to finance its operations and growth. Historically, capital structure theory has evolved considerably with Modigliani and Miller's (1958) irrelevance theorem, which proposed that in an ideal market free of taxes, bankruptcy costs, and information asymmetry, the value of a firm is independent of its financing mix. However, in the real world, market imperfections lead to complex capital structure decisions (Halov & Heider, 2004). The following theories have extended these findings. Trade-Off theory, introduced by Kraus and Litzenberger (1973), considers the effects of taxes and bankruptcy risks and proposes an optimal equilibrium in which the benefits of tax shielding debt are weighed against the costs of financial distress. On the other hand, the Pecking Order theory (Myers & Majluf, 1984) deals with information asymmetry, assuming that companies prefer internal financing to external debt and equity due to the costs associated with adverse selection.

The complexity of capital structure decisions becomes particularly clear when discrepancies in access to information between company managers and external investors can significantly influence financial strategy, also known as information asymmetry. Recent empirical studies by Fukui, Mitton, and Schonlau (2022) support the Pecking Order theory and underline the importance of information asymmetry. Factors such as stock liquidity and analyst coverage are critical indicators of this asymmetry. These indicators have been found in several empirical studies in recent years (Bharath, Pasuariello & Wu, 2009; Derrien & Kecskés, 2013; Fischer, Kim & Zhou, 2021; Akhtar & Batool, 2023). Their results suggest that firms with more significant information asymmetries tend to have higher market leverage and prefer debt when raising new capital, as these conditions increase the relative cost of external equity financing compared to debt.

Given the dynamic and evolving economic landscapes, particularly in times of market distress, such as during the COVID-19 pandemic, these aspects of information asymmetry become even more critical. Market conditions characterized by high uncertainty and volatility can amplify the effects of information asymmetry, influencing corporate transparency and decisions regarding capital structure (Healy and Palepu, 2001).

In summary, indications of a significant relationship between information asymmetry and a firm's debt-to-equity ratio are evident, and market distress is likely to amplify information asymmetry. Thus, information asymmetry could be expected to impact capital structure extensively during market distress, ultimately leading to an insightful research topic.

1.2 Problem Discussion

Despite extensive research on capital structure, the nuanced effects of information asymmetry on corporate financial behaviors, particularly during periods of market distress, still need to be explored. Traditional models such as the Modigliani and Miller Irrelevance Theorem (1958) and the Trade-Off theory (Kraus & Litzenberger, 1973) provide foundational insights. Still, they must fully account for the complexities observed in practice. This gap is particularly significant during economic downturns, when conventional theories may not adequately predict or explain corporate financial behaviors.

As presented by several researchers (Bharath, Pasuariello & Wu, 2009; Derrien & Kecskés, 2013; Fischer, Kim & Zhou, 2021; Akhtar & Batool, 2023), stock liquidity and analyst coverage are common indicators of information asymmetry. Stock liquidity measures how easily investors can trade a company's stocks without affecting the price, generally indicating higher information asymmetry when liquidity is low (Healy & Palepu, 2001). However, liquidity levels can also be influenced by factors such as market volatility or macroeconomic conditions, complicating its use as a direct indicator of information asymmetry. During periods of high market volatility, liquidity may decrease due to external factors rather than firm-specific information issues, making it challenging to interpret low liquidity as a clear sign of information asymmetry (Glosten & Harris, 1988). Despite these drawbacks, stock liquidity remains a valuable proxy due to its straightforward measurement and a general reflection of market perceptions about a company's information environment.

Analyst coverage, reflecting a company's transparency and information availability, is thought to decrease information asymmetry through frequent and diverse financial evaluations (Derrien & Kecskés, 2013). Yet, the effectiveness of analyst coverage can vary depending on the quality and independence of the analyses. Poor quality or biased analyses can mislead investors, reducing the reliability of analyst coverage as an indicator of transparency. High analyst disagreement might indicate significant uncertainty and risks about a company's future, suggesting deeper information asymmetries. However, this disagreement could also arise from different interpretations of the same information, making it a complex proxy that does not straightforwardly reflect information gaps (Knill, Minnick & Nejadmalayeri, 2012). Despite these limitations, analyst coverage is an adequate proxy because it generally enhances the market understanding of a firm and is widely recognized in the literature as a critical factor in reducing information asymmetry.

During times of crisis, such as the COVID-19 pandemic, these variables may interact differently with the market, exacerbating the effects of information asymmetry. Healy and Palepu (2001) indicate that market distress can reduce corporate transparency, complicating firms' efforts to communicate their proper financial health. Akhtar and Batool (2023) found that information asymmetry increased during the pandemic due to heightened uncertainty and market disruptions in the sense that information asymmetry could be linked to significant impacts on stock returns, with bad news having a more severe effect than good news, highlighting the market's sensitivity to negative information during such periods.

Empirical evidence on the impact of information asymmetry on capital structure is at a crossroads. While Derrien and Kecskés (2013) and Bharath et al. (2009) found positive relationships between transparency and capital structure adjustments and between asymmetric information considerations and capital structure decisions, respectively, other studies have reported contrasting findings. For instance, Albanez, Lima, Broedel-Lopes, and Ribeiro do Valle (2010) and Salehi, Rostami, and Hesari (2014) did not find significant relationships between information asymmetry and capital structure decisions in specific markets, suggesting that firm-specific factors such as risk and profitability may play more vital roles. Moreover, studies focusing on smaller stock markets, such as Bundala's (2012) research on Tanzanian firms, have limited generalizability. Their findings, while regionally relevant, do not necessarily apply universally. Consequently, it highlights the need for broader, more inclusive studies considering market conditions and firm-specific factors.

Significant knowledge gaps remain due to the broad availability of research concerning capital structure decisions and information asymmetry. Specifically, how distinct indicators of information asymmetry could impact firms' capital structure decisions during periods of market distress needs further exploration. Previous studies often provide a broad scope without focusing on actual proxies of importance, resulting in a limited understanding of these dynamics.

1.3 Aim and Objectives

Modigliani and Miller's Irrelevance Theorem (1958) and the Trade-Off theory (Kraus & Litzenberger, 1973) both emphasize the important effect capital structure decisions have on a firm's overall performance. This highlights the need to understand the reasoning behind these strategic decisions. Research by Fukui et al. (2022) presented information asymmetry as the most impactful determinant of capital structure. They conducted a thorough study on determinants of capital structure using 55 proposed determinants that showcased how firms with more significant information asymmetries have higher market leverage and are more likely to issue debt when raising new capital. Meanwhile, firms with less information asymmetries are more likely to issue equity. For this reason, the extent of information asymmetry influences the comparative cost of their external capital (Fukui et al., 2022). However, their study does not account for market distress, likely increasing information asymmetry (Healy & Palepu, 2001). Nevertheless, a research gap exists regarding how the increased effects of information asymmetry during market distress affect the decision of capital structure, which is ever so important with the recent observed financial effects of COVID-19.

This paper aims to examine how different indicators of information asymmetry could impact the capital structure decisions of firms during market distress to close the previous knowledge gap by examining two other indicators of information asymmetry. Selecting measurable, impactful, and diverse facets of information flow is critical to analyzing different indicators. This research paper will look at stock liquidity and analyst coverage as they directly correlate with the perceived transparency of a company to investors and markets. Additionally, Fukui et al. (2022) and Bharath et al. (2009) show that these indicators stipulate information asymmetry to a large extent (Fukui et al. 2022; Bharath et al. 2009).

1.4 Purpose

Given the impact of information asymmetry on capital structure and the research gap regarding how this relationship may change during market distress, this study examines the determinants of capital structure in a market of distress.

Building on this foundation, this study aims to answer the following research question.

- *"How do different indicators of information asymmetry impact the capital structure decision of firms during markets of distress?"*

1.5 Research Limitations

The study has limited its research to analyzing companies' financial data from the secondary database LSEG Eikon due to its extensive data availability and accessibility to measure the two capital structure indicators. Furthermore, this thesis has limited the data to 2017-2023 to examine the difference in significance between before and after COVID-19, an example of market distress.

The paper focuses on publicly listed U.S. firms due to their extensive financial disclosures, which are essential for the analysis. These firms adhere to strict regulatory requirements, ensuring high data transparency and consistency between firms. With its significant liquidity, the diverse and efficient American stock market allows for a comprehensive examination of how information asymmetry indicators impact capital structure decisions, enabling the identification of patterns and trends in the relationship between information asymmetry and capital structure (Petacchi, 2015).

Additionally, the data only includes small public listed companies defined by a market capitalization between 300 million and 2 billion USD (FINRA, 2022) as small companies are often subject to the highest levels of information asymmetry (Healy & Palepu, 2001).

Finally, while the capital structure theorem defines two main branches of determinants of capital structure, this paper has limited itself to firm-specific factors due to a firm-established relationship between firm-specific factors and financial decisions (Choi, Sauka & Lee, 2024).

1.6 Outline

The structure of the thesis is split into five chapters. Chapter Two presents a literature review, evaluating existing peer-reviewed scholarly articles and academic journals relevant to the subject. This chapter aims to understand the current state of research and identify knowledge gaps and opportunities. Chapter Three details the methodology, including the research design and sample, and discusses the validity and reliability of the findings. Chapter Four showcases the empirical findings, further discussed in Chapter Five concerning the existing literature. The final chapter summarizes this study's main conclusions and limitations and suggests future research directions.

2.0 Literature Review

This chapter explores the existing scholarly frontier that underpins this research paper, establishing a foundation for the paper's hypotheses, analysis, and findings. It will further explain the concepts of capital structure and information asymmetry, and the authors will highlight the interplay between the two. Finally, the hypotheses will be motivated and presented.

2.1 Theoretical Frameworks

2.1.1 Institutional Theories on Capital Structure

Modigliani and Miller's Irrelevance Theorem (1958), a cornerstone in corporate finance, posits that in a perfect market with no taxes, bankruptcy risks, or asymmetric information, a firm's value is unaffected by its capital structure. The theorem consists of two propositions: Proposition I states that the market value of a company is determined by its earning power and the risk of its underlying assets, regardless of its financing mix. Proposition II suggests that a firm's capital cost remains constant irrespective of its debt-to-equity ratio, as the increased risk taken on by equity holders from additional debt is balanced by the reduced price of debt (Modigliani & Miller, 1958). The later inclusion of corporate taxes in 1963 modified these propositions, introducing the benefits of a tax shield from debt financing, which suggests that debt can enhance firm value by reducing taxable income (Modigliani & Miller, 1963).

Building on the modified propositions of Modigliani and Miller (1963), the Trade-Off theory proposed by Kraus and Litzenberger (1973) introduces the consideration of bankruptcy costs alongside tax shields. This theory suggests that firms should balance the benefits of debt, mainly tax advantages, against the potential costs of financial distress. According to this theory, the optimal capital structure is found when the marginal benefit of tax shields from additional debt equals the marginal cost of economic distress, highlighting a delicate equilibrium that firms must navigate (Kraus & Litzenberger, 1973).

The Pecking Order theory, developed by Myers and Majluf (1984), offers a contrasting perspective rooted in the challenges posed by information asymmetry. This theory posits that firms prioritize their financing sources based on the principle of least resistance and minimal

information disclosure. Internal funds are preferable due to their availability and lack of disclosure requirements, followed by debt, which requires some level of disclosure but less than equity. Equity is the last resort due to the extensive information it requires firms to reveal, which can adversely impact the firm's value if the market perceives it as a sign of overvaluation, leading to an adverse stock price reaction as investors are not as willing to buy the stock. Issuing more shares tends to increase stock liquidity, but if the market thinks the stock is overvalued, trading activity may decrease due to fears of future price drops. This theory becomes particularly relevant in market distress as firms aim to avoid the negative signals that equity issuance might project, further complicating capital-raising efforts (Myers, 2001; Myers & Majluf, 1984).

Incorporating these theories, it becomes evident that while Modigliani and Miller (1963) provide a basic understanding of the irrelevance of capital structure in an ideal world, the Trade-Off (Kraus & Litzenberger, 1973) and Pecking Order Theories (Myers & Majluf, 1984) introduce practical frameworks that acknowledge real-world imperfections such as taxes, bankruptcy risks, and information asymmetry. The Pecking Order theory, in particular, highlights the strategic considerations firms must undertake during periods of market distress. By prioritizing internal financing and cautious use of debt, firms can mitigate the adverse effects of external perceptions and market responses to equity financing, thereby safeguarding their value. Overall, the relevance of these theories in guiding firm behavior during financial uncertainty underscores the complexity of capital structure decisions. Firms must carefully navigate these theoretical insights to align their financing strategies with market conditions and internal capacities, ensuring sustainable growth and valuation in the face of evolving market dynamics.

2.1.2 Institutional Theories on Information Asymmetry

Akerlof's The Market for Lemons Theory (1970) addresses information asymmetry, where sellers know more about their goods than buyers over time. This results in a market dominated by low-quality goods as the high-quality goods are withdrawn. This phenomenon can lead to market collapse, where the equilibrium moves towards a no-trade situation due to buyers' lack of confidence in product quality. This theory underscores the risks associated with information discrepancies in transactions and is relevant to this study for highlighting the informational advantages companies might hold over investors. Building on information

asymmetry, Signaling theory explores how the less informed can assess quality through cost-differentiated signals, reliable indicators of a sender's quality (Spence, 1974). In corporate finance, signaling influences capital structure decisions, particularly in distressed markets; for example, issuing debt can be a strong signal of confidence in future cash flows and overall financial health.

Conversely, a firm reducing its leverage might signal financial concern or preparation for tough times. These signals help reduce information asymmetry by giving the market cues about the firm's expectations and its management's assessment of prospects. Signaling thus helps bridge the information gap by allowing companies to communicate their financial health and strategic intentions. Together, these theories provide a nuanced framework for understanding how companies might manage financial disclosures and capital structure decisions to mitigate the effects of information asymmetry and shape investor perceptions and actions.

2.2 Information Asymmetry's Impact on Capital Structure

2.2.1 Empirical Research

In their study, Fukui et al. (2022) extensively analyzed capital structure determinants, focusing on five fundamental market imperfections: taxes, financial distress, information asymmetry, agency costs, and supply frictions, using data collected on US firms from 1990-2016. The study identified information asymmetry, measured through analyst coverage and stock liquidity, as a critical factor influencing firms' capital structure decisions. The findings show strong empirical support for the Pecking Order theory, which implies that information asymmetry increases the cost of issuing equity because of adverse signaling effects, meaning that more significant information asymmetry should lead to higher debt ratios. However, they find less support for the traditional Trade-Off theory, which focuses on the balance between tax shields and financial distress costs, as only a few variables related to these theories have strong empirical support. Firms with more significant information asymmetry tend to rely more on debt financing, as external financing costs are higher due to a lack of information. The indicators of information asymmetry were stock liquidity, analyst coverage, and analyst disagreement. The authors confirmed their relationship to capital structure and concluded that they were the most significant factors in the study. It is

particularly relevant in periods of market distress where higher external financing costs and more substantial uncertainty heighten the reliance on debt financing (Fukui et al. 2022).

Bharath et al. (2009) also analyze the influence of information asymmetry on capital structure decisions, declared in the Pecking Order theory. The authors develop an aggregated index of information asymmetry where the factors of analyst coverage and stock liquidity are encompassed. The study finds a significant relationship between the information asymmetry index and capital structure decisions. Higher levels of information asymmetry lead firms to rely more on debt than equity, consistent with the Pecking Order theory. The study provides valuable insights into the role of information asymmetry in capital structure decisions and highlights the challenges of measuring and interpreting this asymmetry in a dynamic market context. The methodology, while robust, does not test the individual relationship of each factor, limiting them from excluding factors that might not affect capital structure (Bharath et al., 2009). Jia (2015) further supports the relationship within the high-tech industry, finding that the industry's nature of high levels of information asymmetry had a significant effect on firms' capital structure choices due to its high level of uncertainty regarding returns.

Gao and Zhu (2015) also discuss information asymmetry and its connection to capital structure by comparing their relationship across different countries, considering institutional differences. Their main conclusion is that firms with more significant information asymmetry use more leverage and short-term debt. Additionally, these firms use less long-term debt than those with low information asymmetry. The cost of equity is more sensitive to information asymmetry than the cost of debt. The authors also discuss the impact of institutional regulations and argue that in markets characterized by solid investor protections and transparent financial reporting requirements, the effects of information asymmetry on capital structure alleviates as the rules force companies to disclose more information, reducing information asymmetry. Furthermore, the results show that information asymmetry increases leverage in countries with a developed banking sector and clear bankruptcy laws. The presence of a robust banking system encourages borrowing. Furthermore, Gao and Zhu (2015) highlight the strategic behavior of firms in managing their capital structure under different levels of information asymmetry. They note that firms are likely to adjust their financing strategies on the current level of information asymmetry and their anticipation of future changes in the information environment. For example, firms may use more equity financing during periods of low information asymmetry.

Dittmar and Thakor (2007) introduce a theory of security issuance that diverges from traditional models by emphasizing the role of investor-manager agreement. Their theory posits that firms will issue equity when stock prices and investor agreements are high and debt when both are low, contrasting with other theories that link high stock prices to overvaluation or low information asymmetry. They argue that equity issuance is strategically timed based on stock price and the level of agreement between managers and investors about the firm's prospects. Their study collected data on firms that issued equity or non-convertible debt between 1993 and 2002, examining metrics indicative of market conditions, investor-manager agreement, and information asymmetry. The authors assess information asymmetry by comparing actual earnings per share with analyst forecasts while controlling for factors unrelated to agreement measures. The findings revealed that firms with high investor-manager agreements were likelier to issue equity, suggesting that such alignment reduces perceived risks and increases investor support for new investments. Unlike the Pecking Order theory, which focuses on minimizing adverse selection costs by preferring debt over equity under conditions of high information asymmetry (Myers & Majluf, 1984), Dittmar and Thakor's model highlights the importance of anticipated investor agreement. They suggest that firms may still issue equity in information asymmetry if substantial agreement exists on the firm’s prospects (Dittmar & Thakor, 2007).

The relationship between information asymmetry and capital structure has several times been proven (Bharath et al., 2009; Fukui et al. 2022). However, contrasting views have been presented, and it is understood that information asymmetry is not the sole determinant of capital structure. This does not mean it is not a determinant, but rather part of a multifaceted landscape influencing capital structure decisions. The Pecking Order Theory, supported by Fukui et al. (2022) and Bharath et al. (2009), emphasizes that firms with higher information asymmetry prefer debt over equity. Meanwhile, Gao and Zhu (2015) highlight how institutional environments can mitigate these effects, while Dittmar and Thakor (2007) suggest that firms issue equity based on investor-manager agreement, even with information asymmetry.

2.2.2 Stock Liquidity

Liquidity refers to how quickly an asset converts into cash (Keynes, 1930). Better stock liquidity is attractive for investors and is thus paramount for capital investments. Diamond and Verrecchia (1991) further support this relationship and conclude that information content

increases with higher levels of liquidity. Lower levels of stock liquidity indicate existing information asymmetry, as shown by the Pecking Order theory (Myers & Majluf, 1984), which states that increasing the number of shares available due to equity issuance typically enhances stock liquidity. Tulcanaza, Prieto and Lee's (2019) study on internal and external determinants of capital structure in large Korean firms also found a significant relationship between stock liquidity and information asymmetry. However, if the market perceives the issuance negatively (believing the stock is overvalued), it could lead to reduced trading activity as investors are wary of buying the stock, fearing future price declines (Myers, 2001).

Diamond and Verrecchia (1991) investigate the impacts of public information disclosure on stock liquidity and a firm's cost of capital. They highlight that reducing information asymmetry can decrease a firm's cost of capital by enhancing liquidity, thus making stocks more appealing to large investors. The cost of capital influences capital structure decisions as firms seek to minimize financing costs by choosing an optimal mix of debt and equity, balancing risk and return (Modigliani & Miller, 1963). Diamond and Verrecchia (1991) further demonstrate that disclosure that reduces information asymmetry improves the liquidity of a firm's securities by reducing the price impact of trades and attracting more demand from large investors, who are crucial regarding trading volume that contributes to liquidity. It models the behavior of market participants under different scenarios of public disclosure and information asymmetry, showing that greater disclosure generally benefits large investors by increasing stock liquidity and reducing the costs associated with trading in a less transparent market. Improved disclosure leads to a direct reduction in the firm's cost of capital. Hence, the securities are likely less risky due to the reduced information asymmetry, which lowers the return investors demand. The paper focuses on usual market conditions and assumes rational responses to changes in information asymmetry; hence, it does not investigate behavior during market distress (Diamond & Verrecchia, 1991).

The relationship between stock liquidity and information asymmetry is pivotal, as lower stock liquidity often signals higher information asymmetry, which can affect a firm's financing decisions. The first hypothesis tests whether firms with lower stock liquidity exhibit a higher debt-to-equity ratio, indicating higher information asymmetry.

H_{SL}: Firms with lower stock liquidity will have more debt in relation to equity.

2.2.3 Analyst Coverage

Financial analysts generate information about the firms they monitor, establishing performance benchmarks, including earnings forecasts and stock recommendations (He & Tian, 2013). It is vital for investors to understand the actual value of benchmarks. The absence of analyst coverage thus results in failed maintenance of prices that fairly represent the value of assets (Barth, Kasznik & McNichols, 2001; Koga & Uchino, 2012). For this reason, less analyst coverage leads to information asymmetry, as confirmed by Fukui et al. (2022). The paper by Healy and Palepu (2001) strongly advocates the importance of information intermediaries during market distress to prevent information asymmetry; extensive analyst coverage can avert information asymmetry.

Derrien and Kecskés (2013) investigate the effects of analyst coverage on corporate investment and financing policies, particularly in the context of information asymmetry and on the cost of capital. The article provides empirical evidence that a decrease in analyst coverage, through the resulting increase in information asymmetry and, thus, cost of capital, causes a reduction in investment and financing. As a result of the increasing cost of capital, the profitability of a firm's projects decreases, and hence, the optimal amount of investment decreases. Additionally, as the cost of external financing increases compared to the cost of internal financing, the optimal amount of external financing decreases as well. The findings show that a firm losing an analyst leads to a decrease in total investment and total financing by 1.9% and 2.0% respectively. Similarly, firms that lose an analyst decrease their net total debt issuance and equity issuance by 1.07% and 0.90% respectively. Furthermore, the decrease in analyst coverage causes firms to navigate towards financing that is less sensitive to information asymmetry. The authors find that firms decrease their use of equity and long-term debt, meaning a higher risk. However, they do not change their use of short-term debt, which is considered less risky. While the primary focus of this article is on the investment and financing decisions of firms, these decisions are related to capital structure. This behavior change suggests a preference for maintaining a certain level of liquidity and a cautious approach to taking on new debt or issuing equity under conditions of higher information asymmetry, impacting the overall capital structure (Derrien & Kecskés, 2013).

Another aspect of analyst coverage is the extent of agreement amongst analysts. Analyst disagreement occurs when financial analysts disagree on the scale of companies' anomalies

(Barinov, 2013). Thus, the discrepancies do not mirror market prices, which could result in overpriced stocks (Knill et al. 2012; Fischer et al. 2022). Analyst disagreements are thus an indicator of information asymmetry, as the receiver does not possess complete information. Fischer et al. (2022) explore how analyst disagreement, as an indicator of information asymmetry, affects market dynamics. The authors introduce a novel methodology to measure disagreement through the regression deviation of one analyst's forecast from another's, asserting that perfect alignment would result in a coefficient of one. Their empirical tests validate this measure, linking more significant disagreement to higher trading volumes and narrower bid-ask spreads. Suggesting that while stimulating trading, disagreement does not increase market maker risks as expected. The article distinguishes between information asymmetry, where disparities arise from access to different information, and disagreement, which stems from differing opinions even when the same information is available. The authors argue that both concepts can lead to similar market behaviors, such as increased trading volume. Still, they may have different implications in other contexts, such as how disclosures affect market reactions. They further explore the impact on expected stock returns, finding that higher disagreement, indicative of increased perceived risks and uncertainties, correlates with higher returns. This study effectively highlights how analyst disagreement, beyond mere information asymmetry, influences market behavior and investor responses, offering a nuanced view of the impact of divergent opinions in financial markets (Fischer et al. 2022).

Knill et al. (2012) delve into the connection between information asymmetry and analyst disagreement. Analyst disagreement is a measure of the variation in analysts' forecasts, influenced by their experience and the information asymmetry they face. High disagreement among analysts could indicate more significant uncertainty about a firm's future performance and higher information asymmetry. This disagreement can provide valuable insights into the confidence levels of analysts regarding their information and the underlying firm's condition. Investigating how analyst disagreement responds to information asymmetry can be insightful for understanding how financial analysts navigate uncertain and asymmetric information environments. It shows that disagreement is not merely a sign of confusion or lack of consensus but can be a strategic response to the complex information landscape that analysts operate within (Knill et al., 2012).

To summarize, less analyst coverage equates to higher information asymmetry, potentially leading to higher equity costs than debt. Firms with less analyst coverage may thus lean more towards debt financing to avoid the higher costs of raising equity in the face of significant information asymmetry. The second hypothesis aims to quantify the impact of analyst coverage on the capital structure, suggesting that lesser-covered firms are associated with higher debt-to-equity ratios.

H_{AC}: Firms with less analyst coverage will have more debt in relation to equity.

2.2.4 Interaction

Despite differing views, the relationship between information asymmetry and capital structure remains crucial. Stock liquidity (Diamond & Verrecchia, 1991), as a proxy for market depth and investor confidence, and analyst coverage (Derrien & Kecskés, 2013), as indicators of information availability and consensus, are crucial factors that influence a firm's cost of capital and financing strategy. These factors offer insight into how market perceptions and information flow influence financing choices. This ongoing exploration will deepen the understanding of capital structure determinants amid information asymmetry. The two factors presented above could individually be in connection to information asymmetry. Thus, the next hypothesis suggests that incorporating the two indicators will strengthen the significance.

$H_{interaction}$: Firms with lower stock liquidity and less analyst coverage will have more debt related to equity.

2.3 Market Distress

Healy and Palepu (2001) discuss information asymmetry, corporate disclosure, and capital markets. The authors claim the interaction between corporate disclosure and capital structure is particularly significant during periods of market distress, which tend to exacerbate information asymmetry between managers and investors. The stress on capital markets often leads to reduced transparency and increased uncertainty about the proper financial health of companies. In such times, the clarity and credibility of corporate disclosures, supported by robust regulatory frameworks, become essential. These disclosures help mitigate the elevated risks of misinterpretation and misvaluation due to increased market uncertainty. Information intermediaries, including auditors, financial analysts, and rating agencies, play a critical role

in this process as they scrutinize the disclosures. These analyses provide an additional layer of assurance to investors, thereby reducing information asymmetry. Effective regulation ensures that these disclosures are consistent and truthful, sustaining investor confidence even in volatile market conditions. This dynamic underscores the importance of transparency and regulatory oversight in maintaining the stability of capital markets and influencing corporate financing strategies during economic downturns (Healy & Palepu, 2001). The paper supports the notion that market distress strengthens the relationship between information asymmetry and capital structure, as it becomes increasingly important to have proper reporting to reduce gaps caused by information asymmetry.

While not discussing stock liquidity but stock returns, Akhtar and Batool (2023) find that information asymmetry during market distress could be applied to stock liquidity as the concepts are closely connected. The significant impact of increased information asymmetry on stock returns, mainly how bad news was more detrimental than good news was beneficial, suggests that trading behavior might have been more reactionary and less steady. This environment often results in higher bid-ask spreads and lower overall trading volume, as market participants are more cautious, impacting stock liquidity (Glosten & Milgrom, 1985).

Akhtar and Batool (2023) explore the dynamics of financial markets during the COVID-19 pandemic, focusing on the role of information asymmetry during market distress. The study mainly analyzes the pandemic's effects on stock returns by looking at information asymmetry, which becomes more pronounced during market disruptions, such as a global pandemic. The findings confirm that information asymmetry increased during the pandemic due to heightened uncertainty and market disruptions. The rise in information asymmetry calls for more precise, timely information about a firm's performance and prospects during the pandemic. Consequently, investors have exacerbated the challenge of making informed decisions. The increased information asymmetry had a significant impact on stock returns. The authors suggest bad news (economic downturns) impacted stock returns more severely than good news during the pandemic, indicating the market was more sensitive to negative information (Akhtar & Batool, 2023). Although the paper does not directly discuss capital structure, the increase in information asymmetry can be linked to capital structure decisions, as firms might face higher costs of equity due to increased risk premiums demanded by investors. Because of this, firms could be more willing to rely on internal financing or debt, as supported by the Pecking Order theory (Myers & Majluf, 1984).

The findings previously discussed suggest that the relationship between stock liquidity, analyst coverage, and capital structure becomes even more pronounced during periods of market distress, such as the COVID-19 pandemic. Heightened information asymmetry and reduced stock liquidity during these times increase analysts' importance and information intermediaries' role. Therefore, the following hypotheses aim to test if the relationships between these variables and capital structure were heightened during the COVID-19 pandemic, reflecting the intensified effects of market distress on information asymmetry and corporate financing decisions.

H_{SLMD}: Firms with lower stock liquidity will have more debt in relation to equity during years of market distress.

H_{ACMD}: Firms with less analyst coverage will have more debt in relation to equity during years of market distress.

$H_{interactionMD}$: Firms with both lower stock liquidity and less analyst coverage will have more debt in relation to equity during years of market distress.

3.0 Method

This chapter details the methodology for investigating the impact of information asymmetry on capital structure during market distress. It covers the deductive empirical approach, relevant theories, sampling strategies, data collection from the Eikon database, and statistical analysis techniques. Ensure a robust examination, and prepare for the findings presented in the following chapters.

3.1 Choice of Research Design

To answer the research question, *''How does different indicators of information asymmetry impact the capital structure decision of firms during market distress?"* a deductive empirical study was conducted. Thus, the relevant theories are empirically tested (Bryman & Bell, 2011) and allow the authors to evaluate existing theoretical frameworks and their applicability to real-world market conditions, providing a solid foundation for understanding the dynamics between information asymmetry and capital structure decisions during periods of market distress.

A longitudinal quantitative study is applied to examine data over time, thus providing empirical insights into the research area; it is fundamental to review the impact of market distress as this requires comparing years with and without market distress. Since the sample firms were the same throughout the period, achieving this was possible. The design is fundamentally deductive, applying a structured approach to test specific hypotheses developed from the existing literature and data collection (Sekaran & Bougie, 2016; Bell, Harley & Bryman, 2022). This method was applied based on previous studies regarding information asymmetry and its effect on capital structure, finding an existing relationship between the two factors and establishing clear patterns (Abdel-Wanis & Rashed, 2023; Ho & Gong, 2022).

The authors used the Eikon database to draw financial data samples for the thesis research. Eikon is a renowned secondary database widely recognized for its comprehensive and reliable financial information. Its selection was influenced by its established use in previous studies within the field, ensuring both the relevance and credibility of the data sources (Govindan, Karaman, Uyar & Kilic, 2023; Radu & Dragomir, 2023; Aladwey, Elgharbawy &

Ganna, 2022). By leveraging Eikon, the methodology is aligned with respected research practices, thus enhancing the robustness and validity of the findings. The empirical analysis uses the statistical extension software PHstat because it handles complex data structures, using multiple regression analysis, ANOVA, and variance inflationary factor (VIF) tests.

Secondary data was used due to its accessibility, making it suitable for this study's scope and time limit. As the research question requires data from several companies for several years, this dataset would only be feasible to conduct from a secondary source. However, secondary data could have drawbacks as the database offerings can limit the research (Bryman & Bell, 2011). For example, data from the months that had already passed 2024, mainly January to March, could not be accessed via Eikon, which could have contributed further to the results. However, a primary data source would be time-consuming and limit the sample size, thus making it unsuitable for this thesis.

3.2 Choice of Theories

The selection of theories for this study is based on their relevance to the hypotheses and their established empirical support in the literature on capital structure and information asymmetry. The primary theory chosen is the Pecking Order theory (Myers & Majluf, 1984), as it is particularly relevant to the hypotheses by directly addressing the impact of information asymmetry on capital structure decisions. Complementing the Pecking Order theory, the study also draws on the Trade-Off theory due to its comprehensive nature in counterbalancing the Pecking Order theory by explaining scenarios with the added aspect of tax shields or cost of financial distress. Modigliani and Miller's Irrelevance Theorem (1958) is acknowledged but not applied directly. While it lays the foundational understanding of capital structure, it is unrealistic for this study's context as it does not account for market imperfections. Additionally, Akerlof's The Market for Lemons Theory (1970) illustrates the adverse selection problem caused by information asymmetry. This thesis has utilized the theory for explanatory purposes and will not be applied directly. However, its descendant, Signaling Theory (Spence, 1974), will be more thoroughly utilized to explain how the results of this study may be explained by the usages of signals. The choice to exclude specific theories, such as the Market Timing Theory (Baker & Wulger, 2002), was deliberate. Although it provides insights into how firms might time their equity issuance to market conditions, it does not directly address the core connection of the study, which is the impact of information

asymmetry. Similarly, the Agency Theory (Jensen & Meckling, 1976) was irrelevant as it primarily focuses on conflicts of interest between managers and shareholders, which is not the central focus of the research.

3.3 Sample

This thesis has utilized purposive and stratified sampling as it minimizes selection bias to improve the representativeness of the sample (Berenson, Levine, Szabat & Stephan, 2019)

3.3.1 Geographical Sample

The decision to focus on the United States stems from several key advantages of the U.S. financial system and market dynamics. The U.S. financial markets are among the most developed and central, providing a robust framework for analyzing the interactions between capital structure and information asymmetry during market distress. Since the USA hosts the two largest stock exchanges in the world (Statista, 2022), a broad range of companies is available, facilitating data availability and comparability as databases generally provide comprehensive and high-quality data on these companies. This setup allowed the study to focus exclusively on one country while still gathering sufficient data points for each sector, which benefited the study's aims. Additionally, limiting the sample to one market will make the sample more coherent, as country-specific determinants will not affect the data. Accordingly, it will help isolate the indicators of information asymmetry and make external factors less adherent. Focusing on a single market allows the analysis to ignore differences in capital structure that arise from country-specific determinants, something previous studies have shown exists (Venanzi, 2017; De Jong, Kabir & Nguyen, 2008).

3.3.2 Time Period of Sample

The sample was selected from 2017-2023, enabling examination of the interplay between capital structure and information asymmetry during market distress, mainly focusing on the recent impacts of the COVID-19 pandemic. The years 2020-2022 mark a significant phase of global economic disruption due to the pandemic, making this period particularly insightful for studying shifts in capital structures in response to market distress. The COVID-19 pandemic led to unprecedented financial challenges, marked by sharp asset price declines and a surge in market volatility in early 2020. This period thus offers a unique context for

analyzing how information asymmetry influences capital structure in periods of heightened uncertainty and risk. Including the years preceding and following the pandemic, 2017-2019 and 2023, respectively, allows for a comparative analysis of the financial behaviors under normal conditions and the aftermath of a period of market distress. Thus, the study defines 2020-2022 as market distress (COVID-19) and 2017-2019 and 2023, respectively, as periods of no significant market distress. This approach helps isolate the effects of COVID-19 from other economic variables and thus provides a broader understanding of the relationship between capital structure decisions and information asymmetry.

3.3.3 Filtering

The data sample was collected using LSEG Eikon, retrieved through a screening on public companies sorted using the following filters:

- Country of Headquarters: United States of America.
- Country of Exchange: United States of America.
- Country of Incorporation: United States of America.
- Company Market Capitalization: Between 300 million USD to 2 billion USD.

A multistage cluster sampling method is evident because the study draws a large sample and filters it into different stages, thus reducing the sample size from the first to the last. Since the risk of sample errors ought to be minimized, the more prominent the sample is, the more sample errors in this study are possible due to the sampling method (Berenson et al., 2019). By applying these filters, the study aims to produce a homogeneous dataset that eliminates many external variables, namely the multistage cluster sampling method (Berenson et al. 2019). Focusing only on public companies headquartered, listed, and incorporated in the United States ensures regulatory uniformity, as all companies adhere to US regulatory standards. This uniformity minimized the distortions that arise from varying regulations between countries on financial reporting and corporate governance, as well as varying macroeconomic conditions, market practices, and currency fluctuations. All firms operate under similar tax, fiscal, and economic policies, ensuring that any observed differences are likely due to company-specific factors rather than external factors, which is in line with the limitations of this study. Similar limitations are present in various studies investigating information asymmetry and capital structure (Lindroth, Thygesson & Åberg, 2023; Coy & Garcia-Feijoo, 2022; Bharath et al. 2009; Rajan & Zingales, 1995). Before applying the

filters, Eikon provided 67.9 thousand companies. When the authors used the country of headquarters, it generated 8618 companies; adding the country of exchange resulted in 8610 companies, and the country of incorporation limited the sample to 8608 companies.

Finally, the authors applied the company market capitalization filter to minimize the sample size and only look at companies with small market capitalization, between 300 million USD and 2 billion USD (FINRA, 2022). The motivation for this is that smaller companies generally experience the highest levels of information asymmetry due to less analyst coverage and fewer disclosure requirements (Healy & Palepu, 2001). Applying this filter generated 1169 companies.

Finally, each variable was extracted for seven years, covering the period of 2017-2023. This period was suitable as the research question examines the information asymmetry effect on capital structure during market distress. Data will include 2020 as a mark for COVID-19, an example of market distress, and three years before and after since the results of market distress can be comparable to a regular market state. Furthermore, companies with data points for all dependent-, independent- and control variables during all years are present since it is crucial to establish a sample of companies for all seven regressions (2017-2023) to allow for comparisons between years. This ultimately generated a sample of 305 companies.

3.4 Variables

3.4.1 Dependent Variable

The net debt to total equity ratio was chosen as the dependent variable $NDTE_{it}$ to assess the capital structure of companies. This metric is a fundamental financial measure calculated by dividing a company's total liabilities by its shareholder equity after subtracting cash and cash equivalents. It reveals how much net debt a company uses to finance its assets relative to the equity provided by shareholders. The net debt to total equity ratio is superior to the ordinary debt to equity ratio because it allows for a more accurate reflection of a company's financial leverage by accounting for cash and cash equivalents, offering a clearer picture of net indebtedness and economic risk (Arhinful & Radmehr, 2023). Furthermore, using the net debt to total equity ratio as a dependent variable in the capital structure analysis is well-founded, as evidenced by its frequent application in prior research. Previous studies, such as those by

Karanovic (2023) and Pradhan and Kafle (2021), have effectively employed this ratio to measure capital structure, demonstrating its relevance and reliability. By adopting this established metric, the study aligns with proven methodologies, thereby ensuring the legitimacy and comparability of the results within the broader academic discourse.

$$Net\ Debt\ to\ Total\ Equity\ =\ (Total\ Liabilities\ -\ Cash\ \&\ Cash\ Equivalents)/Shareholder\ Equity$$

A higher net debt to total equity ratio indicates a greater financial leverage. It suggests that a company might be taking on more debt to finance its growth, which can increase financial risk if not managed properly. Conversely, a lower ratio implies a conservative approach, with the company relying more on equity financing, suggesting more excellent financial stability but indicating the underutilization of available credit facilities that could fuel growth.

3.4.2 Independent Variables

Stock liquidity and analyst coverage are valuable measures of information asymmetry. Consequently, two independent variables apply to test each indicator of information asymmetry. This thesis will use four independent variables in the multiple regression model to determine the effect of information asymmetries on capital structure.

3.4.2.1 Stock Liquidity

Previous studies such as Zhang, Ding, and Zhou (2024) and Lakhal (2008) have applied stock liquidity as a significant factor when measuring information asymmetry. Stock liquidity is measured by two indicators: turnover ($\beta_1 \text{Turnover}_{it}$) and bid-ask spread ($\beta_2 \text{BASpread}_{it}$). The study counts the average daily trading volume divided by the total number of shares outstanding for each company to measure the Turnover Ratio. This ratio indicates a company's stock's liquidity and trading activity within a financial market. A higher turnover ratio suggests that the shares are frequently trading, which often correlates with high liquidity and possibly greater investor interest or market volatility. On the other hand, a lower turnover ratio may indicate lesser trading activity and potentially lower liquidity, which could affect the ease with which shares are bought and sold in the market. Turnover dramatically depends on the company's size, as larger companies typically have a higher turnover due to their scale. Here, turnover is a ratio concerning the total number of shares outstanding. Furthermore, when used as a control variable, market capitalization will accurately isolate the effect of

turnover by comparing companies of similar size. Additionally, this risk is lower when comparing publicly traded companies within a specific span of market cap as these filters limit the size variation. Additionally, turnover ratios have been applied in other studies seeking to undermine stock liquidity (Ayadi & Paseda, 2023; Cakici & Zaremba, 2021; Aharon, Demir, Kizys, Zaremba & Zawadka, 2021).

$$Turnover = Average\ Daily\ Trading\ Volume / Total\ Number\ of\ Shares\ Outstanding$$

Bid-ask spread is a significant measurement of stock liquidity (Daadaa, 2021; Zhang & Wong, 2023). The variable is calculated for each company by taking the ask price minus the bid price. The bid price is the highest price a buyer is willing to pay for a security, and the asking price is the lowest price a seller is willing to accept. The bid- and ask price collected from the database represents the annual average for each company. Hence, the variable is the yearly average bid-ask spread.

$$Bid - Ask\ Spread = Ask\ Price - Bid\ Price$$

The bid-ask spread is a vital indicator of stock liquidity, reflecting how easily and quickly a stock can be traded at stable prices. A low bid-ask spread indicates the stock trade cost is lower, suggesting high liquidity, whereas a wide spread indicates higher transaction costs, reflecting lower liquidity (Erwin & Miller, 1998). Glosten and Harris (1988) highlight that part of the spread is due to asymmetric information, which impacts liquidity by affecting how market participants perceive and respond to the spread. However, other indicators, such as trading volume, should be included to determine the liquidity assessment.

3.4.2.2 Analyst Coverage

Analyst coverage will be measured by the number of analysts ($\beta_3 \text{Analysts}_{it}$) and analyst disagreement ($\beta_4 \text{Disagreement}_{it}$). The number of analysts represents analyst coverage as it provides an indication of the level of interest and attention a particular stock receives from the analyst community, often correlating with the company's perceived importance and potential (Unsal, 2019; Kim, Kim & Shim, 2023; Hamrouni, Benkraiem & Karmani, 2017). The variable is the number of analysts who have specified a recommendation for the company stock during the year.

Analyst disagreement is a measurement of analyst coverage as it reflects the variation in opinions among analysts regarding recommendations (Fiorillo, Gangi, Meles, Mustilli & Salerno, 2023). The variable is the standard deviation of analyst recommendations of each company from 2017-2023. The authors extracted the recommendations from Eikon with the following names of range:

Recommendation - strong buy (marked by 5)
Recommendation - buy (marked by 4
Recommendation - hold (marked by 3)
Recommendation - sell (marked by 2)
Recommendation - strong sell (marked by 1)

Standard deviation represents the extent of disagreement by measuring the variance of each variable. In the context of analyst recommendations, it quantifies how much individual analyst opinions deviate from the mean (average) recommendation. A higher standard deviation indicates more significant disagreement among analysts, as their views diverge more significantly from the average.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{5}(x_i - \bar{x})^2}{5}}$$

Where:
σ: Standard deviation
Σ: The sum
x_i: Each individual recommendation score
$\bar{x}$: The mean of the recommendation scores
5: The number of recommendation types

3.4.2.3 Interaction

An additional regression is applied using an interaction variable to test if the relationship is more robust when all indicators of information asymmetry are applied. This interaction effect variable comes about by multiplying the product of each independent variable (Mokdadi & Saadaoui, 2023; Jan & Kreinovich, 2021). As the independent variables, turnover and the

number of analysts are hypothesized to increase debt when lower. In contrast, the independent variables bid-ask spread and analyst disagreement are hypothesized to increase debt when higher, and the variables first need to be standardized. This was done through a Z-score formula:

$$Z = \frac{X - \mu}{\sigma}$$

Where:
Z: The standardized variable
X: The original value
μ: the mean
σ: Standard deviation

Using the standardized values mentioned above, the following formula was applied to factory the variables and generate an interaction variable:
Interaction Variable = $Z_{Turnover}$x $Z_{Number\ of\ analysts}$ - $Z_{Bid\text{-}Ask\ Spread}$ x $Z_{Number\ of\ Analyst}$ + $Z_{Bid\text{-}Ask\ Spread}$ x $Z_{Analyst\ Disagreement}$ - $Z_{Turnover}$ x $Z_{Analyst\ Disagreement}$ - $Z_{Turnover}$ x $Z_{Bid\text{-}Ask\ spread}$ - $Z_{Number\ of\ analysts}$ x $Z_{Analyst\ Disagreement}$

Justification:
$Z_{Turnover}$x $Z_{Number\ of\ analysts}$: Reflects the combined impact of low turnover and low analyst coverage.
- $Z_{Bid\text{-}Ask\ Spread}$ x $Z_{Number\ of\ Analys}$: Reflects the combined impact of high bid-ask spread and low analyst coverage
$Z_{Bid\text{-}Ask\ Spread}$ x $Z_{Analyst\ Disagreement}$: Reflects the combined impact of high bid-ask spread and high analyst disagreement
- $Z_{Turnover}$ x $Z_{Analyst\ Disagreement}$: Reflects the combined impact of low turnover and high analyst disagreement
- $Z_{Turnover}$ x $Z_{Bid\text{-}Ask\ spread}$: Reflects the combined impact of low turnover and high bid-ask spread on liquidity
- $Z_{Number\ of\ analysts}$ x $Z_{Analyst\ Disagreement}$: Reflects the combined impact of number of analysts and analyst disagreement

3.4.3 Control Variable

Market capitalization, logarithmically transformed, is used as a control variable substantially to mitigate the influence of extreme values from substantial companies, thereby normalizing data and facilitating more meaningful comparisons across a diverse range of company sizes, used by previous studies (Yadav, Pahi & Gangakhedkar, 2019; Gupta, 2020; Hyungkee, Cho & Fazio, 2016). The logarithmic transformation helps stabilize the variance and improve the model's interpretability of the data distribution. This approach is beneficial as some independent variables are highly dependent on the size of the company, ensuring that the scale of the company does not unduly influence the results of the analysis. Furthermore, research has shown that market capitalization as a control variable can significantly affect financial outcomes (Vyrostkova & Kadarova, 2023; Tolmunen & Torstila, 2005; Vale & Camoes, 2023). For instance, larger firms have different financial policies and investments than smaller firms (Triki & Abdi, 2023). Because of their size and stability, more prominent firms might have access to better financing options and tend to pay dividends, reflecting a more stable financial outlook, which can affect stock performance and valuation perceptions. Furthermore, the size of a firm, as indicated by its market capitalization, can influence its diversification strategies, investment policies, and performance (Nguyen, Wong & Vuong, 2023). Larger firms can undermine excellent substantial and diverse investment opportunities due to more significant resources and better access to capital markets. They also face different levels of risk, which can influence their capital structure, including their leverage, as reflected by metrics such as the net debt to total equity ratio. Thus, controlling for firm size using market capitalization helps isolate the effect of size when studying the impact of other variables. Previous researchers have also used market capitalization as a control variable for the dependent debt-to-equity ratio (Nukala & Prasada Rao, 2017; Yadav, Pahi, Gangakhedkar, 2021).

3.4.4 Excluded Variables

As this thesis is, amongst others, based on the Trade-Off theory (Kraus & Litzenberger, 1973), one might question why the tax is not present as a control variable. The decision to exclude tax as a control variable is due to the practical challenges and limitations of measuring tax effects across different firms and periods. While tax considerations are crucial in the Trade-Off theory, empirical studies often need help obtaining consistent and

comparable tax data (Frank & Goyal, 2009). Additionally, the primary focus of this study is on information asymmetry indicators and their impact on capital structure. Including tax variables could introduce complexity and potential confounding effects, detracting from the clarity of the analysis of the specified indicators. Furthermore, while LSEG Eikon has measurements of taxes, there are more data points for the chosen sample. If taxes were to be included, more than the sample would be required to ensure normality. Therefore, taxes are not included in the regression.

3.5 Regression Model and Hypotheses

This study has used multiple regression to examine the relationship between information asymmetry and capital structure during market distress. Net debt to total equity is the dependent variable, market capitalization is the control variable, and the remaining independent variables. In total, 14 multiple regression models apply, one for each of the seven years included in the sample using each independent variable. Based on the general formula for multiple regression, the following formula shows:

$$NDTEit = \beta_0 + \beta_1 Turnover_{it} + \beta_2 BASpread_{it} + \beta_3 Analysts_{it} + \beta_4 Disagreement_{it} + \beta_5 Interaction_{it} + \beta_6 MarketCap_{it} + \varepsilon_{it}$$

Where:

- $NDTEit$= net debt to total equity ratio for firm i in year t
- β_0 *:* Intercept of the regression
- $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$*:* Coefficients for the independent variables
- $Turnover_{it}$*:* Turnover for firm i in year t
- $\beta_2 BASpread_{it}$: Bid-ask spread for frim i in year t
- $\beta_3 Analysts_{it}$: Number of analysts covering firm i in year t
- $\beta_4 Disagreement_{it}$: Analyst disagreement for firm i in year t
- $\beta_5 Interaction_{it}$: Interaction effect for form i in year t
- $\beta_6 MarketCap_{it}$: Market capitalization for firm i in year t (control variable)
- ε_{it}: Error term for firm i in year t

Based on the regression model, the following research hypotheses were tested using a 95% confidence interval, meaning a significance level of 5% by common academic standards (Berenson et al. 2019).

H_{SL}: Firms with lower stock liquidity will have more debt in relation to equity.

$$H_0: \beta_{1,} \geq 0 \ \& \ \beta_2 \leq 0$$
$$H_1: \beta_1 < 0 \ \& \ \beta_2 > 0$$

H_{AC}: Firms with less analyst coverage will have more debt in relation to equity.

$$H_0: \beta_{3,} \geq 0 \ \& \ \beta_4 \leq 0$$
$$H_1: \beta_3 < 0 \ \& \ \beta_4 > 0$$

$H_{interaction}$: Firms with lower stock liquidity and less analyst coverage will have more debt related to equity.

$$H_0: \beta_5 \leq 0$$
$$H_1: \beta_5 > 0$$

H_{SLMD}: Firms with lower stock liquidity will have more debt in relation to equity during years of market distress.

$$H_0: \beta_3^{2020\text{-}2022}{}_{,} \geq 0 \ \& \ \beta_4^{2020\text{-}2022} \leq 0$$
$$H_1: \beta_3^{2020\text{-}2022} < 0 \ \& \ \beta_4^{2020\text{-}2022} > 0$$

H_{ACMD}: Firms with less analyst coverage will have more debt in relation to equity during years of market distress.

$$H_0: \beta_3^{2020\text{-}2022} \geq 0 \ \& \ \beta_4^{2020\text{-}2022} \leq 0$$
$$H_1: \beta_3^{2020\text{-}2022} < 0 \ \& \ \beta_4^{2020\text{-}2022} > 0$$

$H_{interactionMD}$: Firms with both lower stock liquidity and less analyst coverage will have more debt in relation to equity during years of market distress.

$$H_0: \beta_5^{2020\text{-}2022} \leq 0$$
$$H_1: \beta_5^{2020\text{-}2022} > 0$$

3.6 Description of Research Procedure and Data Collection

In this study, secondary data obtained from the LSEG Eikon database was utilized and accessed through their Screener tool in Excel. This approach allowed us to use comprehensive market data that covers a significant portion of global market valuations, ensuring the robustness and relevance of the data set for analyzing capital structures across a diverse range of companies. The data collection focused primarily on financial metrics pertinent to the study, including the net debt to total equity ratio, liquidity measures, and data on analyst coverage. Thus, the study systematically investigates the influence of these financial indicators on the capital structure decisions of firms listed in major financial markets. All measurements were taken from the same database to ensure the integrity and consistency of the data. This uniformity is crucial as it eliminates the need to adjust for discrepancies when combining data from multiple sources. Such a methodological approach enhances the reliability of the analysis by maintaining a standardized format and scale across all data points.

Furthermore, using LSEG Eikon, a well-established financial database, provides several advantages. The tool's integration with Excel facilitated efficient analysis and processing of data retrieval. This integration is particularly beneficial for handling large datasets typical of comprehensive financial analyses, ensuring accuracy and timeliness in data processing. Relying on a single, established source for data collection aligns with best practices in economic research, minimizing the risk of data inaccuracies and providing a solid foundation for empirical investigations (Bryman & Bell, 2017). Through this data collection, the study aims to achieve credibility of the research findings, providing clear and actionable insights into how different financial metrics influence firm behavior and capital structure in various market contexts.

3.7 Description of Data Analysis and Instruments

The data collected through LSEG Eikon was directly imported into Microsoft Excel, facilitating efficient handling and manipulation of the dataset. The study uses PHstat, an extension program in Microsoft Excel known for its broad suite of statistical tools, making it ideal for conducting sophisticated data analyses directly within the Excel environment (Wright, n.d.). First, a descriptive statistical summary of each variable displays an initial understanding of the data's distribution, central tendencies, and variability. This foundational

step was crucial for identifying anomalies or patterns in the dataset that might influence further analyses. Subsequently, the study uses tests to ensure assumptions and avoid potential errors through a VIF test, a normal distribution test, and a coefficient matrix. Furthermore, the study uses a multiple regression analysis to test the hypotheses. For example, the study employs the adjusted R-squared statistic to measure the proportion of variance in the dependent variable, which the independent variables, the coefficient, and the p-value could explain. This approach allowed us to quantify the impact of each independent variable on the dependent variable. Each step of the regression analysis was tested at a 0.05 level of significance, aligning with common academic standards for hypothesis testing (Berson, Levine, & Szabat, 2015). This standard ensures the findings are robust and statistically significant, providing credible insights into the factors influencing firms' capital structure.

3.8 Method Discussion

3.8.1 Reliability

Reliability indicates the consistency of a specific measure of a concept. There are three factors to consider when deciding whether a measure is reliable: stability, internal reliability, and inter-observer consistency (Bryman & Bell, 2011). The study applied the most recent and consistent data set available for 2023 from LSEG Eikon to ensure stability. This data uniformity allows the study's results to be replicated under similar conditions, guaranteeing the measures remain stable over time. The advantage of using a single, reputable data source such as Eikon ensures that any future attempts to replicate the study would yield consistent data sets, thereby stabilizing the measure within this research context. Given the secondary nature of the data, assessing internal reliability and ensuring that all indicators effectively measure the same construct could be an issue. Nonetheless, inter-observer consistency only applies to this study since no primary observation or data collection is present. Hence, no variation in the consistency of the data collection and analysis is expected (Bryman & Bell, 2011). Furthermore, the sample selection was influenced by its established use in previous studies within the field, ensuring both the relevance and credibility of the data sources (Govindan, Karaman, Uyar & Kilic, 2023; Radu & Dragomir, 2023; Aladwey, Elgharbawy & Ganna, 2022).

By using established financial metrics and ensuring they align with recognized financial theories and frameworks, the study maintained coherence among the variables. Although secondary data can limit direct control over how variables are defined and measured, the credibility of the data source and alignment with established financial metrics enhance internal reliability. The potential for variability in data interpretation due to different observers was minimized by having a single researcher handle both data collection and analysis. This approach ensures that understanding financial metrics and applying statistical methods through PH-stat remain consistent, reducing the risk of subjective discrepancies that might arise from multiple interpreters. The study strives to provide reliable results by addressing these aspects, with the methodology designed to ensure replicability under consistent conditions.

3.8.2 Validity

Validity refers to the extent to which the research design and methods accurately capture and reflect the constructs and variables they measure (Bryman & Bell, 2011). Internal validity refers to whether the observed relationships in the data can confidently be attributed to the influence of the independent variables on the dependent variables rather than being caused by extraneous factors. The longitudinal research design of the study enhances internal validity by allowing researchers to observe and measure changes and trends within the same entities over different periods (Bryman & Bell, 2011). This approach provides a more robust framework for establishing causal relationships than cross-sectional studies, as it can demonstrate consistency of effects across time. Using data from different time points allows the study to find discerning patterns and relationships between variables, consequently strengthening the internal validity of the analysis. Thereby reducing the likelihood that the findings are due to temporal anomalies or unobserved variables. Thus, the longitudinal nature of the study not only supports a more substantial claim of causality but also provides a clearer understanding of how relationships between variables develop over time, significantly strengthening the internal validity of the findings. Additionally, using control variables enhances internal validity by limiting the impact of variables excluded from the scope of the dependent variable. However, this could be further reassured by including more control variables (Bryman & Bell, 2011).

External validity refers to the generalizability of the findings beyond the specific settings and samples used in the study (Bryman & Bell, 2011). Given that the data is sourced from LSEG Eikon and represents a broad spectrum of firms, there is a strong potential for generalizing the findings to similar financial contexts. However, the specific focus on companies listed in major financial markets may limit the generalizability to different types of companies or those operating in markedly different economic or regulatory environments. Thus, while the results likely apply to other large, publicly traded firms, caution should be exercised when extending these findings to small and medium enterprises or firms in emerging markets.

Measurement validity in the study ensures that the financial ratios and variables used accurately represent the financial constructs (Bryman & Bell, 2011). Relying on standardized and widely accepted financial metrics obtained from LSEG Eikon ensures that the measures align with the connected concepts. For example, the net debt to total equity ratio is a recognized measure of financial leverage used by several other studies (Arhinful & Radmehr, 2023; Karanovic,2023; Pradhan & Kafle, 2021), while liquidity ratios and analyst coverage are indicators of market perceptions and investment risk. The integrity of these measures is supported by their widespread acceptance in financial research and practice, which underpins the validity of the study's measurement. Additionally, the measures of the independent variables have been defined correspondingly and used by other research papers, including bid-ask spread (Daadaa, 2021; Zhang & Wong, 2023), turnover (Ayadi & Paseda, 2023; Cakici & Zaremba, 2021; Aharon et al. 2021), number of analysts (Unsal, 2019; Kim et al. 2023; Hamrouni et al., 2017) and disagreement (Fiorillo et al. 2023). Furthermore, applying market capitalization as a control variable within the capital structure and information asymmetry has been widely tested in previous studies (Yadav et al. 2019; Gupta, 2020; Cho et al. 2016).

4.0 Results

The results section will present the outcomes of the regressions to address the research objective. The chapter begins with descriptive statistics for each sector and a presentation of the tests performed. Finally, the regressions conducted, including the main regressions and stability tests, will be presented.

4.1 Descriptive Data

Table 1: Descriptive summary of net debt to total equity

	2023	2022	2021	2020	2019	2018	2017
Mean	0.824	0.969	0.858	0.286	1.048	1.068	0.392
Median	0.378	0.407	0.299	0.279	0.375	0.316	0.297
Mode	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	-58.650	-55.246	-32.081	-110.587	-54.671	-7.950	-97.090
Maximum	42.576	117.114	91.857	56.252	67.540	43.568	33.436
Range	101.225	172.360	123.938	166.839	122.211	51.518	130.526
Standard Deviation	5.178	8.334	6.237	7.978	6.621	4.521	6.820

Table 2: Descriptive summary of turnover

	2023	2022	2021	2020	2019	2018	2017
Mean	0.091	0.066	0.094	0.122	0.096	0.098	0.116
Median	0.048	0.038	0.050	0.055	0.053	0.047	0.040
Mode	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	0.001	0.000	0.000	0.000	0.000	0.001	0.000
Maximum	1.200	0.636	3.413	2.031	1.361	1.651	8.195
Range	1.199	0.636	3.413	2.031	1.360	1.650	8.195
Standard Deviation	0.142	0.082	0.219	0.239	0.148	0.177	0.500

Table 3: Descriptive summary of bid-ask spread

	2023	2022	2021	2020	2019	2018	2017
Mean	0.050	0.045	0.071	4.751	0.169	0.153	0.239
Median	0.020	0.020	0.030	0.160	0.020	0.010	0.030
Mode	0.010	0.010	0.010	N/A	0.010	0.010	0.010
Minimum	0.003	0.004	0.003	-272.527	0.001	0.001	0.001
Maximum	2.310	1.340	2.000	609.530	15.330	8.727	20.750
Range	2.307	1.336	1.997	882.057	15.329	8.726	20.749
Standard Deviation	0.156	0.100	0.150	65.788	1.012	0.693	1.421

Table 4: Descriptive summary of number of analysts

	2023	2022	2021	2020	2019	2018	2017
Mean	5.941	5.948	5.980	6.331	6.446	6.295	6.357
Median	5.000	5.000	5.000	6.000	5.000	5.000	5.000
Mode	4.000	4.000	4.000	4.000	5.000	4.000	5.000
Minimum	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Maximum	29.000	27.000	29.000	23.000	31.000	28.000	25.000
Range	28.000	26.000	28.000	22.000	30.000	27.000	24.000
Standard Deviation	3.887	3.831	3.686	3.559	4.128	4.025	4.069

Table 5: Descriptive summary of disagreement

	2023	2022	2021	2020	2019	2018	2017
Mean	1.522	1.504	1.494	1.516	1.539	1.539	1.560
Median	1.265	1.265	1.265	1.329	1.329	1.265	1.329
Mode	0.837	0.816	0.837	0.816	0.816	0.816	0.837
Minimum	0.408	0.408	0.408	0.408	0.408	0.408	0.408
Maximum	7.305	6.979	6.401	6.113	7.111	7.421	7.521
Range	6.897	6.570	5.992	5.705	6.703	7.012	7.113
Standard Deviation	0.976	0.943	0.830	0.766	0.915	0.948	0.950

Table 6: Descriptive summary of interaction

	2023	2022	2021	2020	2019	2018	2017
Mean	0.012	0.267	0.920	-152.791	1.727	1.361	1.102
Median	0.005	0.052	0.080	0.181	0.078	0.057	0.076
Mode	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	0.000	0.000	0.000	-38165.147	0.000	0.000	0.000
Maximum	5.066	9.622	141.210	9947.231	274.869	95.103	38.676
Range	5.066	9.622	141.210	48112.378	274.869	95.103	38.676
Standard Deviation	0.002	0.798	8.149	2831.967	16.217	8.343	4.569

Table 7: Descriptive summary of market capitalization

	2023	2022	2021	2020	2019	2018	2017
Mean	8.946	8.872	9.012	8.939	8.896	8.820	8.883
Median	8.964	8.941	9.056	8.979	8.928	8.847	8.911
Mode	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Minimum	7.427	5.938	5.962	5.788	6.376	6.208	6.299
Maximum	9.542	9.732	10.109	10.256	10.241	10.214	10.251
Range	2.115	3.794	4.146	4.469	3.865	4.006	3.952
Standard Deviation	0.266	0.429	0.434	0.478	0.483	0.516	0.532

Table 1-7 shows a descriptive summary of the dependent and independent variables from 2017-2023. As seen by the tables, the trend of transformation over the years is that the mean changes significantly for most variables around 2020. Analyst disagreement is the sole variable, with only slight change throughout the years, remaining relatively stable throughout all measurements. On the other hand, the mean number of analysts per year decreases significantly in 2021, the year after COVID-19. A similar transition is evident in net debt to total equity. The mean increases considerably in 2021 and onwards, in line with the increase in both maximum- and minimum values. The mean turnover increased in 2020, the year of COVID-19. Similarly, the bid-ask spread has a higher mean and range in 2020. However, the standard deviation also increased in 2020, indicating a more extensive spread from the mean. Finally, the interaction variable decreases significantly in 2020, followed by a significant increase in 2021.

A notable difference is that net debt to total equity and the number of analysts are affected by this impact with a year's delay. Some variables foresee changing the year after COVID-19 as

their effect on financial decisions is short; instead, they take time to implement. Mainly, the number of analysts and net debt to total equity is generally not changed daily (Ranga & Pathak, 2023; Riantani, 2022). Conversely, turnover and bid-ask spread experienced more immediate effects from the pandemic, as appeared in 2020, since both variables are results from the stock market, which is more sensitive to market changes and will see almost immediate realization.

4.2 Tests for Assumptions about Error Terms and Variables

4.2.1 Multicollinearity

Table 8: Variance inflation factor 2017-2023

VIF	2017	2018	2019	2020	2021	2022	2023
Turnover	1.508	1.756	1.409	1.264	1.073	1.411	1.070
Bid to ask spread	1.015	1.006	1.007	1.010	1.034	1.076	1.022
Number of Analysts	7.374	8.840	7.734	5.978	6.146	6.868	7.040
Disagreement	6.660	7.657	7.418	5.729	5.880	6.648	6.786
Interaction	1.301	1.004	1.254	1.063	1.090	1.056	1.039
Market capitalisation	1.553	1.523	1.402	1.336	1.243	1.377	1.160

As the four different dependent variables can be classified under two categories, testing for multicollinearity is essential as it helps ensure that the variables are not highly correlated, which could distort the analysis results and lead to misleading conclusions. A variance inflation factor (VIF) test applies to mitigate this risk. As depicted in Table 1, two variables show high multicollinearity: the number of analysts and analysts who disagree with VIF values above five through all seven years. Thus, it is difficult to determine the individual effect of each predictor on the response variable. As the variables are essential to hypothesis testing, multiple regression was remade once with all variables but with the number of analysts and once with all variables but with analyst disagreement. This method reduces multicollinearity without altering the interpretation of the regression coefficients. As this

resulted in the adjustment of variables, the VIF re-examines for all variables to ensure no alarming effect on the other variables' multicollinearity. The new results in Tables 9 and 10 indicate no apparent multicollinearity.

Table 9: Variance inflation factor for all variables but number of analysts 2017-2023

VIF	2017	2018	2019	2020	2021	2022	2023
Turnover	1.003	1.014	1.011	1.005	1.001	1.015	1.005
Bid to ask spread	1.009	1.003	1.004	1.003	1.031	1.085	1.022
Disagreement	1.183	1.152	1.179	1.137	1.122	1.083	1.095
Interaction	1.008	1.004	1.009	1.008	1.060	1.005	1.058
Market capitalisation	1.180	1.157	1.170	1.139	1.141	1.135	1.078

Table 10: Variance inflation factor for all variables but disagreement 2017-2023

VIF	2017	2018	2019	2020	2021	2022	2023
Turnover	1.002	1.014	1.005	1.007	1.187	1.015	1.007
Bid to ask spread	1.010	1.002	1.005	1.004	1.032	1.087	1.027
Number of Analysts	1.291	1.233	1.213	1.175	1.171	1.114	1.134
Interaction	1.009	1.005	1.008	1.009	1.057	1.003	1.067
Market capitalisation	1.29	1.24	1.21	1.17	1.19	1.161	1.11

4.2.2 Normal Distribution

Brooks (2019) states that the assumption of normality can be ignored if the sample size is big enough. Ross (2017) explains that normality can be assumed when the sample is over 30. The

sample used for this study is 305, ergo large enough to assume normally distributed data. The authors thus conclude that non-normality is not an issue.

4.3 Correlation Matrix

Table 11: Variance inflation factor for all variables but disagreement 2017-2023

	2017	2018	2019	2020	2021	2022	2023
Net debt to total equity	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Turnover	0,020	-0,047	0,036	-0,071	-0,029	-0,015	0,018
Bid-ask spread	-0,012	-0,050	-0,020	0,012	-0,044	-0,030	-0,011
Number of analysts	0,110	0,015	0,063	-0,031	-0,080	-0,161	-0,084
Disagreement	0,060	0,000	0,039	-0,071	-0,084	-0,144	-0,084
Interaction	-0,004	-0,055	-0,021	-0,015	-0,011	-0,032	-0,031
Market capitalisation	0,131	-0,068	-0,007	0,012	0,000	-0,019	0,062

The unstandardized correlation matrix examines and showcases the correlation between net debt and total equity for all years. The test shows that most variables correlate significantly as none of the values approaches one, indicating no strong linear relationship or that the influence of other moderating factors is not evident in this correlation framework. Therefore, none of the coefficients support any of the hypotheses. None of the variables have a consistent positive or negative correlation between net debt and total equity, thus confirming the lack of linearity. A notable data transformation is that the number of analysts and analysts disagreed, going from a positive coefficient to a negative in 2020. While still not significant, it indicates that both independent variables positively correlates to net debt to total equity before COVID-19, meaning that with more disagreement and analysts, the net debt to total equity tended to increase. Conversely, during COVID-19, there was less disagreement, and analysts had a negative correlation. However, this relationship does not support the hypothesis. Finally, interaction is the only consistent variable throughout the period but indicates no significant correlation. Additionally, the hypothesis posited a positive linear relationship between the variable and net debt to total equity, yet Table 11 presents the opposite.

4.4 Results of Regression

By drawing two multiple regressions, the study terminates the risk of multicollinearity. These two separate tests will be called *all but number of analysts* and *all but analyst disagreement*—consequently, the remaining variables will have two values of results. The study will only examine the results individually if they provide deviating results for the hypotheses.

Table 12: All but number of analysts regression statistics 2017-2023

Regression Statistics	2017	2018	2019	2020	2021	2022	2023
Multiple R	0.134	0.102	0.064	0.107	0.106	0.152	0.125
R Square	0.018	0.010	0.004	0.012	0.011	0.023	0.016
Adjusted R Square	0.005	-0.003	-0.009	-0.002	-0.002	0.010	0.003
Standard Error	6.803	4.527	6.651	7.985	6.243	8.292	5.171
Observations	305	305	305	305	305	305	305

Table 13: All but number of disagreement regression statistics 2017-2023

Regression Statistics	2017	2018	2019	2020	2021	2022	2023
Multiple R	0.144	0.109	0.086	0.081	0.105	0.172	0.130
R Square	0.021	0.012	0.007	0.007	0.011	0.029	0.017
Adjusted R Square	0.008	-0.001	-0.006	-0.007	-0.002	0.016	0.004
Standard Error	6.793	4.524	6.640	8.005	6.244	8.265	5.168
Observations	305	305	305	305	305	305	305

Table 14: All but number of analysts P-value 2017-2023

P-value	2017	2018	2019	2020	2021	2022	2023
Intercept	0.038	0.117	0.642	0.599	0.898	0.872	0.166
Turnover	0.756	0.365	0.492	0.223	0.612	0.987	0.742
Bid to ask spread	0.767	0.414	0.726	0.912	0.389	0.426	0.672
Disagreement	0.860	0.672	0.394	0.173	0.110	0.011	0.063
Interaction	0.642	0.557	0.404	0.789	0.368	0.322	0.793
Market capitalisation	0.042	0.191	0.6814	0.474	0.689	0.886	0.125

Table 15: All but disagreement P-value 2017-2023

P-value	2017	2018	2019	2020	2021	2022	2023
Intercept	0.094	0.089	0.514	0.717	0.824	0.979	0.136
Turnover	0.732	0.377	0.491	0.228	0.592	0.989	0.693
Bid to ask spread	0.821	0.412	0.701	0.905	0.386	0.391	0.639
No of analyst	0.338	0.411	0.190	0.548	0.117	0.004	0.050
Interaction	0.631	0.545	0.367	0.768	0.355	0.300	0.787
Market capitalisation	0.117	0.141	0.531	0.639	0.636	0.727	0.102

4.4.1 Stock Liquidity

Firstly, the study examines hypotheses H_{SL} and H_{SLMD} to determine if firms with lower stock liquidity have more debt in relation to their equity and if this relationship intensifies during market distress. Furthermore, the study tests the relationship between net debt to total equity and bid-ask spread and turnover in a longitudinal setting with the following periods: during all years (2017-2023) and then comparing years of COVID-19 (2020-2022) to the years without (2017-2019; 2023). Both regressions reveal that the p-values far exceed the 0.05 threshold for bid-ask spread and turnover. Thus, the test fails to reject the null hypothesis, and

there is no significant evidence to support the alternative hypothesis $H_{SL.}$ During the years identified as the period of market distress (2020-2022), the two multiple regressions showed no p-value below 0.05, indicating a lack of statistical significance, thus failing to reject the null hypothesis and not providing significant support for hypothesis H_{SLMD}.

4.4.2 Analyst Coverage

Secondly, the study examines hypotheses H_{AC} and H_{ACMD} to establish if lower analyst coverage generates a higher net debt to total equity ratio and if this intensifies during market distress. Similarly to stock liquidity, the p-value exceeds 0.05 in both regressions for most years for the number of analysts and analyst disagreement. However, for 2022, the number of analysts and analyst disagreements have a p-value below 0.05. Additionally, in 2023, the p-value is precisely 0.05 for the number of analysts. While indicating support for the hypothesis, the estimation is prominent. Because of the nature of sampling data, sample errors could influence the results and thus yield misleading outcomes.

During the COVID-19 market distress years (2020-2022), neither variable consistently generated a p-value below 0.05. However, both findings suggest a potentially stronger but not statistically significant relationship, especially in 2020. However, the lack of consistent statistical significance across these years suggests that while the trend may exist, more is needed to confirm more significant effects during market distress than in regular years, indicating no definitive support for hypothesis $H_{ACMD.}$

4.4.3 Interaction

Thirdly, the study examines hypotheses $H_{interaction}$ and $H_{interactionMD}$ to decipher if firms will have more debt with their equity if all indicators of information asymmetry are higher through the interaction variable. Since no year has a p-value below 0.05, the null hypothesis fails to be rejected, and the test shows no significant support for either hypothesis $H_{interaction}$ or $H_{interactionMD}$

4.4.4 Control Variable

The variable market capitalization, a representation of the firm's total market value, notably, none of the years reached statistical significance at conventional levels with a p-value below

0.05. While market capitalization is essential, its impact on net debt to total equity ratios in the models must consistently demonstrate a clear directional trend or robust statistical significance.

The fluctuating nature of the market capitalization coefficients suggests variability in how market valuation influences financial leverage across different years: this could be evident because of various external economic conditions or sector-specific dynamics that the models did not control for. The lack of statistical significance across all years suggests that while market capitalization is an essential characteristic of firms, its direct impact on the net debt to total equity ratio might be moderated by other factors not captured in this study.

4.5 Additional Testing

Table 16: Simple linear regression statistics for number of analysts 2017-2023

Year	2017	2018	2019	2020	2021	2022	2023
Intercept P-value	0,279	0,047	0,571	0,439	0,015	0,001	0,006
No of Analysts P-value	0,054	0,791	0,274	0,590	0,162	0,005	0,143
Intercept Coefficient	-0,783	0,960	0,399	0,725	1,670	3,056	1,489
No of Analyst Coefficient	0,185	0,017	0,101	-0,069	-0,136	-0,351	-0,112
R-squared	0,012	0,000	0,004	0,001	0,006	0,026	0,007
Adj R-squared	0,009	-0,003	0,001	-0,002	0,003	0,023	0,004
Standard Error	6,790	4,528	6,618	7,988	6,227	8,239	5,168
Observations	305	305	305	305	305	305	305

To test for robustness and to conclude that there is no significance between the dependent and independent variables, a simple linear regression was performed on the independent variable with the lowest P-value through the years, shown to be number of analysts. The simple linear regression confirms that, overall, there is no significance. While the p-value is below the

level of significance in 2022, it is feasible due to the statistical change of five percent of being significant (Berenson et al. 2019).

5.0 Discussion

The discussion section critically evaluates the study's findings with the formulated hypotheses, explicitly examining how different indicators of information asymmetry affect capital structure decisions during periods of market distress. The analysis ties the empirical data back to the theoretical framework established in earlier chapters and assesses the impact of market distress on information asymmetry and capital structure.

5.1 Analysis of Regression Results

The study aimed to evaluate the role of information asymmetry in capital structure decisions among publicly listed U.S. firms during periods of market distress. The main finding of this thesis is that the overall significance of the regression models is low. The R-squared and adjusted R-squared values indicate that the models do not explain a substantial portion of the variability in the net debt to total equity ratio. The adjusted R-squared being even lower suggests that the independent variables included in the model are not strong predictors of the dependent variable. The low R-squared values across the years indicate a limited explanatory power, implying that other factors not captured by the models might be more influential in determining capital structure (Berenson et al. 2019). The statistical significance of individual coefficients further underscores the limited trustworthiness of the results. Most p-values for the independent variables are above the conventional threshold for statistical significance, indicating that the relationships between these variables and the net debt to total equity ratio are not statistically robust. The lack of significant coefficients across different years suggests that the observed relationships might be due to random variation rather than underlying economic or financial principles.

Given the low R-squared values and the high p-values for most variables, the regression models do not provide strong evidence to support any hypotheses regarding the influence of stock liquidity and analyst coverage on capital structure. While the models suggest potential trends, such as a possible relationship between analyst coverage and debt levels, the lack of statistical significance and low explanatory power indicate that these trends must be more reliable. Additionally, the economic and market context, particularly during the COVID-19 pandemic, may have introduced unique factors and interventions that the model needs to account for, further complicating the analysis. Therefore, interpret the results cautiously, and

any conclusions drawn from these models are considered tentative and exploratory rather than definitive.

Berenson et al. (2019) consider correlations below 0,3 as weak and below 0,1 as very weak, indicating only a small linear relationship. No correlation between net debt to total equity and an independent variable is above 0,3, meaning the degree to which changes in these variables are associated with changes in net debt to total equity is minimal. The correlation matrix shows a negative correlation turnover, and the dependent variable is weak, primarily negative but positive, in 2019 and 2023. A negative correlation indicates that higher turnover (higher liquidity) is associated with lower net debt to total equity, agreeing with the hypothesis on stock liquidity. However, due to the weak and varying correlation, no conclusions can be drawn. The correlation between bid-ask spread and net debt to total equity is also negative in all years except 2020 when it is slightly positive. This negative correlation suggests that net debt to total equity decreases as the bid-ask spread increases (indicating lower liquidity). In contrast, this opposes the hypothesis that low stock liquidity results in higher debt reliance. However, the slight positive correlation supports the theory that market distress would strengthen the mentioned relationship. Still, it needs to be more robust to draw any conclusions. The correlation between the number of analysts and net debt to total equity was positive between 2017 and 2019, and after that, it turned negative. A negative correlation indicates that higher analyst coverage decreases net debt to total equity, which follows the hypothesis. Regarding analyst disagreement, the correlation is generally negative, turning slightly positive in 2019. The negative correlation suggests more significant analyst disagreement (higher information asymmetry) is connected to lower net debt to total equity, contradicting the belief that high information asymmetry is associated with high net debt to equity. Additionally, the interaction variable shows a negative correlation in all years. While insignificant, this finding indicates that the combined effect of all the variables generally leads to lower net debt to total equity.

5.2 Integration of Findings with Literature Review

The results challenge the concept of information asymmetry as a determinant of capital structure, declared by the Pecking Order theory (Myers and Majluf, 1984). While the theory suggests that firms with more significant information asymmetry would prefer debt to avoid the negative signaling of equity issuance, the findings in this thesis provide no empirical

results that support this theory. However, as no conclusion can be drawn based on the significance, the results do not provide evidence that the Pecking Order theory would be untrue. This discrepancy may be due to the evolving dynamics of financial markets or the complex nature of capital structure decisions, where firm-specific factors and broader economic conditions also exert significant influence.

These results contradict those of other studies, namely Fukui et al. (2022) that show strong empirical support for the Pecking Order theory and information asymmetry as a determinant of capital structure through significant relationships between capital structure and stock liquidity, analyst coverage, and disagreement. Bharath et al. (2009) concluded this from their study using an aggregated information asymmetry index. Nevertheless, the results of this thesis show opposing results, indicating no significant relationship between these variables in the chosen sample. This might be due to different samples; Fukui et al. 's (2022) sample was U.S. firms from 1990-2016, and Bharath et al. (2009) used a sample from 1973-2002, and U.S. firms. Time might play a part in this difference in results. Additionally, these studies used more advanced and comprehensive testing methods that are out of the range of this thesis which could explain why the results of this thesis do not confirm the conclusions drawn by Fukui et al. (2022) and Bharath et al. (2009).

Furthermore, this thesis is limited to investigating firm-specific determinants of capital structure. Nonetheless, Gao and Zhu (2015) find a strong connection between information asymmetry and the cost of capital during certain regulatory conditions. Taking regulations into account might have provided more precise results. The studies by Albanez et al. (2010) and Salehi et al. (2014) did not find significant relationships in their specific markets, respectively, meaning this is not the first study contradicting the belief of a connection between information asymmetry and capital structure. Dittmar and Thakor (2007) also present a different view of why firms issue equity, including the degree of agreement between managers and investors about future prospects of firms. They suggest a high degree of agreement is the leading reason firms issue equity, even in information asymmetry. However, this study focuses on information asymmetry during market distress and its direct impact on capital structure decisions.

5.2.1 Stock Liquidity

The first hypothesis explored the relationship between stock liquidity and net debt to total equity, measured through bid-ask spread and turnover. Despite theoretical predictions suggesting that lower liquidity would lead to a higher reliance on debt (Diamond & Verrecchia, 1991), the findings were statistically insignificant across the years, including during the period identified as market distress (2020-2022). The coefficients of the bid-ask spread varied without a clear pattern, and all corresponding p-values were well above the 0.05 significance threshold. Similarly, the coefficients for turnover mainly were non-negative. Furthermore, they lacked statistical significance (e.g., 2020, 2022, and 2023 turnover coefficients did not significantly explain the variance in the net debt to total equity ratio). Additionally, the correlations were weak and varied between positive and negative, suggesting no support for the hypothesis. These findings indicate that stock liquidity, as measured by bid-ask spread and turnover, does not significantly influence capital structure decisions in the context of this study. This contradicts previous literature, specifically the findings of Glosten and Milgrom (1985) and Diamond and Verrecchia (1991), who posited that lower liquidity (higher information asymmetry) should lead firms to prefer debt over equity. The lack of significance in these variables during regular and distressed periods implies that other factors might be more influential in determining capital structure during market stress. Therefore, the first hypothesis cannot be confirmed, suggesting that while stock liquidity may play a role in capital structure decisions, its effect needs to be sufficiently strong and consistent to be a relevant determinant in the periods analyzed.

5.2.2 Analyst Coverage

The second hypothesis explored the relationship between analyst coverage and capital structure, expecting that lesser coverage (higher information asymmetry) would lead to higher debt usage. Additionally, more significant analyst disagreement was hypothesized to correlate with higher net debt to total equity ratios due to the increased uncertainty and perceived risk associated with such a dispute. The coefficients for the number of analysts were consistently negative across the years, indicating a trend where fewer analysts were associated with higher debt levels. For instance, the p-values were near significance in some years (2017 and 2020), suggesting a potential effect. However, these results were not robust enough to draw definitive conclusions. Contrary to the hypothesis, higher analyst

disagreement was often associated with lower net debt to total equity ratios. The coefficients were negative, as well as the correlations and none of the results reached statistical significance, indicating that higher disagreement did not lead to higher debt levels as expected. The correlations were both weak, and number of analysts changed from positive to negative in 2020 and forward. A negative correlation suggesting that higher analyst coverage reduces net debt to equity, which could be in connection with the pandemic outbreak supporting the hypothesis. However, the question remains as to why the correlation was positive previously and the correlations all and all are too weak to draw conclusions from. The findings for analyst coverage partially indicates support for the hypothesis that lesser analyst coverage could influence firms to prefer debt. However, as they are weak and considered insignificant this cannot be determined. This indication is in line with the theoretical predictions of Derrien and Kecskés (2013), who found that reduced analyst coverage increases information asymmetry and cost of capital, leading to higher debt levels. However, the lack of consistent statistical significance suggests that other factors are prone to influence capital structure decisions.

The unexpected negative relationship between analyst disagreement and debt levels indicates that firms might adopt more conservative financing strategies in response to high disagreement, possibly to mitigate perceived risks, aligning with the results of Fischer et al. (2022), who found that more significant analyst disagreement correlates with higher trading volumes and narrower bid-ask spreads, suggesting disagreement stimulates trading without increasing market maker risks. This distinction implies that while information asymmetry and disagreement can lead to increased trading, their effects on capital structure decisions may differ. Knill et al. (2012) also demonstrated that analyst disagreement, influenced by information asymmetry, indicates more significant uncertainty about a firm's future performance. This understanding suggests disagreement reflects a strategic response to complex information environments rather than mere confusion. Therefore, the hypothesis about analyst disagreement leading to higher debt levels is not supported or consistent with these findings.

These results suggest that analyst coverage and disagreement interact with capital structure more complexly than initially hypothesized. The observed trends underline the need for further research to understand the underlying mechanisms, especially during periods of market distress when traditional theories may not fully capture the dynamic nature of

financial decision-making. Thus, while there is some support for the influence of analyst coverage on capital structure, the findings are not definitive, and the hypothesis about analyst disagreement leading to higher debt levels is not supported.

5.2.3 Interaction Variable

The results also lead to rejecting the interaction hypothesis, motivated by empirical evidence that does not support the theoretical expectation. The findings suggest that lower stock liquidity and less analyst coverage do not significantly influence firms' capital structure decisions, particularly in the market conditions studied. Additionally, weak and negative correlation between the interaction variable and net debt to total equity does not provide additional support.

5.2.4 The Role of Market Distress

Market distress significantly impacts corporate financial strategies, particularly in managing capital structure amidst heightened uncertainty and risk. The theoretical framework suggested that during periods of market distress, such as the COVID-19 pandemic, firms might exhibit stronger preferences for debt financing due to increased information asymmetry (Healy and Palepu, 2001; Akhtar & Batool, 2023). Thus, firms are likely to seek to minimize new equity issuance, which could signal financial weakness in the market. The analysis aimed to identify whether market distress amplifies the effects of information asymmetry on capital structure decisions. The premise relies on the notion that during market distress, the flow of information becomes constricted or distorted, thus increasing the information gap between insiders (managers) and outsiders (investors and analysts), as suggested by Akhtar and Batool (2023). Such circumstances would lead firms to rely more heavily on debt rather than exposing themselves to the adverse market reactions that might accompany equity issuance under uncertain conditions. However, the empirical data in this study did not support the hypothesis that market distress amplifies the reliance on debt financing linked to information asymmetry indicators, such as stock liquidity and analyst coverage.

On the other hand, the descriptive statistics show that debt usage increased in 2021 compared to 2020, possibly due to the pandemic. Influences from market distress suggest that while firms make financing decisions, they may also weigh other factors, such as interest rates, access to credit, and broader economic forecasts., in their financing decisions. However, the

mean level of net debt to total equity in 2021 is lower than the years before the pandemic, meaning this could be due to other factors as the level is not consistent. The mean net debt to total equity decreased in 2020, possibly due to corporate caution or preservation of cash, as interest rates typically increase during distressed periods (Feder-Sempach, Szczepocki & Bogołębska, 2024). Furthermore, the range between minimum and maximum bid-ask spread increased rapidly during 2020, reflected in the mean that also increased. However, the numbers return to a neutral level in 2021, indicating this might only be a market chock as a result of the outbreak of COVID-19. The variability in results during periods of market distress highlights the complex nature of financial decision-making under uncertainty. Firms may react differently based on their sector, inherent financial health, managerial expectations, and previous market volatility experiences. Additionally, the impact of regulatory environments and governmental interventions during crises, such as financial aid or policy changes, could also mitigate or exacerbate the expected outcomes.

The results do not allow uniformly confirming the predicted behaviors outlined by theories such as the Pecking Order theory and Signaling theory during distress (Myers & Majluf, 1984; Spence, 1974). Furthermore, as no significant relationship is evident between the dependent and the independent variable, neither before, during, or after the pandemic, the conclusion that increasing information asymmetry during market distress leads firms to rely more on debt compared to equity cannot be affirmed, as argued for by Healy and Palepu (2001).

6.0 Conclusion

The conclusion section summarizes the main conclusions of the thesis and revises the research aim. The chapter also dissects the study's limitations and suggests potential areas for future research within the field.

6.1 Conclusion of Results

This study aims to examine how different indicators of information asymmetry impact a firm's capital structure decisions during market distress. The research gap being how the increased effects of information asymmetry during market distress affect capital structure. Six hypotheses were derived and tested through several multiple linear regression models to answer the study's research question: *How do different indicators of information asymmetry impact the capital structure decision of firms during markets of distress?* The regression models revealed low explanatory power, with insignificant coefficients indicating that supported indicators of information asymmetry cannot conclude as strong predictors of capital structure. Other factors might better explain financing choices in such periods. Additionally, market distress during the pandemic years had no significant impact on the primary outcomes for each indicator. The findings suggest that indicators of information asymmetry, stock liquidity, and analyst coverage do not significantly affect capital structure in an American setting, contradicting the Pecking Order theory (Myers & Majluf, 1984). Therefore, broader economic factors and firm- or industry-specific characteristics can be expected to influence firms' capital structure decisions more.

6.2 Limitations

This study has several limitations that leave avenues for further research. The statistical methods used may only partially capture the dynamic nature of capital structure decisions over time. For example, panel data regression could provide a more insightful analysis by accounting for cross-sectional and time-series variations. Additionally, the need for industry-specific analyses limits the generalizability of findings across different sectors. The decision not to filter for a specific industry was due to the small sample size, and filtering for all industries would have required extensive multiple regression tests beyond the scope of this thesis. Furthermore, this thesis only accounts for one example of market distress, namely COVID-19. As a period of market distress could have varying impacts on financial

measurements depending on the qualities of distress, the results should be generalized with caution when applying it to other instances of market distress. Additionally, the research confines itself to a specific geographic region and period, potentially reflecting factors beyond broader trends or different regulatory environments. The exclusion of control variables such as tangibility, Tobin's Q ratio, and profitability further limits the understanding of factors influencing capital structure decisions. Lastly, the lack of a significant relationship between analyst coverage and capital structure during market distress suggests that external assessments less influence companies' financing decisions in such periods.

6.3 Suggestions for Future Research

Future research could enhance the understanding of information asymmetry's impact on capital structure decisions, especially during periods of market distress, by employing more comprehensive statistical tests such as panel data regression. This approach would allow for a more robust analysis by accounting for both cross-sectional and time-series variations. Comparative analyses across different industries could uncover sector-specific dynamics as the optimal level of capital structure might vary between industries. Expanding the sample size to include more firms across diverse geographic regions and periods could improve the generalizability of the findings. Additional control variables could provide a more comprehensive understanding of the factors influencing capital structure. Adding industry dummy variables in the regression model could help control for industry-specific bias, isolating the effects of information asymmetry indicators from industry characteristics. Future research should also consider the impact of regulatory environments and broader economic conditions on capital structure decisions, as well as the role of managerial behavior and investor sentiment during periods of market distress. Examining or comparing between different crises is also an avenue for future research. The impact of information asymmetry on capital structure may vary based on different crises, for example, comparing COVID-19 to the financial crisis 2008.

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Appendix

Authorship Statement

This thesis is the original work of Natalie Holmqvist, Fanny Larsson, and Vera Lyxell, conducted under the guidance and supervision of Zahida Sarwary at Lund University. The authors carried out the research, analysis, and writing, ensuring the integrity and authenticity of the work presented. We conceptualized the research topic, formulated the research question, conducted the literature review, and developed the methodology independently. Data collection, including the design and execution of drawing samples, was meticulously performed by us, following ethical standards and academic rules and with the help of several statistical consultations with Jakob Bergman at the Statistical Department of Lund University. The insights and conclusions drawn from the analysis result from critical thinking and scholarly interpretation.

All chapters have been written and reviewed by all three group members. Natalie wrote most parts of chapter one, all; however, chapter two has been reviewed and changed many times throughout the conduction of this thesis, but Fanny wrote the original draft for most of the text. Vera mainly wrote chapters three and four. Chapter five was, to a large extent, written by Fanny, and chapter six was written together by all three. However, as previously mentioned, we have cooperated when writing all chapters. The person listed as the main writer is mainly responsible for researching and deciding what should be included in that part of the thesis. We all stand by every part.

While ChatGPT were used for inspiration and refinement, as detailed in the AI Usage Statement below, the authors independently developed all intellectual content, including the literature synthesis, results interpretation, and conclusions formulation. The AI's role was limited to enhancing the text's clarity, coherence, and grammatical accuracy.

AI Usage Statement

This thesis has utilized Open AI's tool ChatGPT to assist with grammar and feedback for all chapters of the study. Additionally, ChatGPT assisted in section 2, the literature review, by explaining concepts from advanced research that the authors required assistance on to understand.

Examples of prompts are:

- Please give feedback on this paragraph.
- What is another word for X?
- Is this sentence grammatically correct?
- Please advise how to write this passage from passive to active voice.
- Can you explain this concept in easier terms?

Correlation Matrices

Table 17: Correlation between all variables 2023

2023	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.011	1.000					
Market capitalisation	0.062	-0.022	1.000				
Turnover	0.018	0.068	0.013	1.000			
Disagreement	-0.084	-0.129	0.268	0.002	1.000		
No of analyst	-0.084	-0.142	0.314	0.033	0.923	1.000	
Interaction	-0.031	0.244	0.125	0.494	0.295	0.282	1.000

Table 18: Correlation between all variables 2022

2022	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.030	1.000					
Market capitalisation	-0.019	-0.256	1.000				
Turnover	-0.015	0.087	0.023	1.000			
Disagreement	-0.144	-0.127	0.261	0.066	1.000		
No of analyst	-0.161	-0.148	0.305	0.067	0.921	1.000	
Interaction	-0.032	0.235	0.054	0.513	0.282	0.295	1.000

Table 19: Correlation between all variables 2021

2021	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.044	1.000					
Market capitalisation	0.000	-0.164	1.000				
Turnover	-0.029	-0.002	0.026	1.000			
Disagreement	-0.084	-0.107	0.326	0.004	1.000		
No of analyst	-0.080	-0.118	0.377	-0.011	0.911	1.000	
Interaction	-0.011	0.142	0.078	0.225	0.189	0.168	1.000

Table 20: Correlation between all variables 2020

2020	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	0.012	1.000					
Market capitalisation	0.012	0.020	1.000				
Turnover	-0.071	-0.052	0.045	1.000			
Disagreement	-0.071	-0.010	0.346	0.031	1.000		
No of analyst	-0.031	-0.015	0.382	0.065	0.908	1.000	
Interaction	-0.015	0.356	-0.070	-0.194	-0.053	-0.045	1.000

Table 21: Correlation between all variables 2019

2019	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.020	1.000					
Market capitalisation	-0.007	0.056	1.000				
Turnover	0.036	-0.025	-0.022	1.000			
Disagreement	0.039	0.042	0.378	-0.099	1.000		
No of analyst	0.063	0.059	0.413	-0.067	0.930	1.000	
Interaction	-0.021	0.524	0.097	0.019	0.210	0.262	1.000

Table 22: Correlation between all variables 2018

2018	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.050	1.000					
Market capitalisation	-0.068	0.046	1.000				
Turnover	-0.047	0.007	-0.104	1.000			
Disagreement	0.000	0.034	0.359	-0.085	1.000		
No of analyst	0.015	0.030	0.432	-0.095	0.926	1.000	
Interaction	-0.055	0.635	0.093	0.095	0.172	0.161	1.000

Table 23: Correlation between all variables 2017

2017	Net debt to total equity	Bid to ask spread	Market capitalisation	Turnover	Disagreement	No of analyst	Interaction
Net debt to total equity	1.000						
Bid to ask spread	-0.012	1.000					
Market capitalisation	0.131	0.045	1.000				
Turnover	0.020	-0.004	0.023	1.000			
Disagreement	0.060	-0.061	0.383	-0.040	1.000		
No of analyst	0.110	-0.058	0.467	-0.026	0.920	1.000	
Interaction	-0.004	0.445	0.124	0.549	0.160	0.160	1.000