

MASTERARBEIT | MASTER'S THESIS

Titel | Title

The Impact of Business Cycles on Corporate Debt structure

verfasst von | submitted by
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angestrebter akademischer Grad | in partial fulfilment of the requirements for the degree of
Master of Science (MSc)

Wien | Vienna, 2026

Studienkennzahl lt. Studienblatt | Degree
programme code as it appears on the
student record sheet:

UA 066 974

Studienrichtung lt. Studienblatt | Degree
programme as it appears on the student
record sheet:

Masterstudium Banking and Finance

Betreut von | Supervisor:

Univ.-Prof. Mag. Günter Strobl PhD

Abstract

Diese Arbeit untersucht, wie sich die Unternehmensverschuldungsstruktur im Verlauf des Konjunkturzyklus entwickelt, mit besonderem Fokus auf die Aufteilung zwischen Bank- und Anleihefinanzierung. Auf Basis eines Paneldatensatzes von 397 nicht-finanziellen S&P-500-Unternehmen im Zeitraum 2003–2023 werden Veränderungen im Schuldenwachstum und in der Schuldenzusammensetzung über Konjunkturphasen hinweg analysiert. Die Ergebnisse zeigen, dass Unternehmen in Rezessionen verstärkt auf Bankfinanzierung zurückgreifen, während die Bedeutung der Anleihemärkte abnimmt. Diese Befunde unterstreichen die zentrale Rolle des Bankensektors bei der Aufrechterhaltung der Unternehmensfinanzierung in wirtschaftlichen Abschwungphasen.

Table of Contents

Introduction.....	3
Rationale	5
Literature review.....	8
Theoretical framework.....	8
Empirical evidence.....	10
Data.....	12
Variables	13
Descriptive statistics	16
Regression models	18
Total Debt Growth	19
Bank Debt and Bond Debt Growth.....	21
Bank Debt Share and Bond Debt Share.....	24
Limitations	27
Conclusion and Future Work	28
References.....	31
AI Disclosure Statement	32
Appendix - Additional Regression Results.....	33

Introduction

The choice between bank and market debt (private and public debt) is not only a capital structure decision, but has broader implications for both firms and the economy. At the firm level, bank loans provide flexibility through monitoring and renegotiation, while market debt enables large-scale, arm's-length financing, meaning that shifts in reliance affect costs, flexibility, and investment capacity.¹ At the macro level, the relative use of banks versus markets influences how credit shocks and monetary policy transmit into real activity, making the debt structure a crucial channel for understanding business cycles.²

Corporate borrowing relies on two main channels: private debt provided by banks, and public debt raised in capital markets. Firms continuously adjust their reliance on private debt, such as bank loans and credit lines, versus public debt, including senior and subordinated bonds. The goal of every company is to try to maximize efficiency and profitability, which both can be affected by decision of financing method. Additionally, business cycles play an important role in shaping these choices, as fluctuations in credit supply, investor risk appetite, and aggregate uncertainty alter the relative attractiveness of debt markets across expansions and contractions.

Several theoretical models suggest that in periods of financial distress, such as recessions³, renegotiation is more feasible with concentrated private lenders than with dispersed public bondholders, implying that prior and during financial crisis firms may shift toward bank debt. Furthermore, firms tend to substitute away from public debt toward private debt during recessions, as interest rate spreads across markets widen in times of stress.⁴ Other evidence indicates that contractions in private loan supply and higher intermediation costs increase the relative attractiveness of public markets, leading some firms to shift from bank loans to bond financing during crises.⁵

¹ Diamond (1991); Bolton and Freixas (2000).

² Kashyap, Stein, and Wilcox (1993).

³ Throughout this paper, the terms recession, downturn, and financial crisis are used interchangeably and are defined as a period characterized by a decline in real GDP for two consecutive quarters.

⁴ Halling, Yu, and Zechner (2016); Wang (2024).

⁵ Goel and Zemel (2018).

While capital structure research has long examined how firms adjust leverage over the business cycle, most studies have focused on aggregate debt ratios, with comparatively little attention paid to the composition of debt between bank loans and public bonds. The dynamic reallocation between bank-based and market-based debt, particularly across multiple recessions and recoveries, has received little systematic empirical attention. In light of the theoretical ambiguity surrounding how firms adjust their debt structure during economic downturns, the empirical analysis in this thesis focuses on providing systematic evidence from a long and heterogeneous panel of non-financial S&P500 corporations. Prior research on recession-driven changes in debt composition motivates an examination of whether firms shift toward bank lending, valued for its flexibility and monitoring, or rely more heavily on bond markets when banking capacity is constrained. Studying this dynamic over the 2003–2023 period, which includes both the Global Financial Crisis and the COVID-19 recession, offers a unique opportunity to observe how firms respond to financial crisis that differ in severity, duration, and financial market functioning.

The empirical regression framework captures financing adjustments along two dimensions: quarterly growth in total, bank, and bond debt, and changes in debt composition reflected in the relative shares of bank and bond financing. By including recession and pre-recession dummy variables, a measure of financial constraints based on the KZ index, and macroeconomic controls, the analysis evaluates predictions from theories of financial intermediation and credit market segmentation.

The results reveal clear patterns that clarify the relative importance of each financing channel across the business cycle. Overall borrowing increases in recessions, with total debt rising by 1.77% (Pooled OLS) and 2.68% (FE) more per quarter relative to non-recession periods, consistent with firms relying more on external finance when internal cash flows weaken. This aggregate expansion is driven almost entirely by bank borrowing. In the bank-debt models, bank debt growth rate grows sharply during recessions, increasing by about 29.2% (Pooled OLS) and 31.4% (FE), and the relative share of bank debt in total debt rises by approximately 3.03 percentage points (Pooled OLS) and 3.23 percentage points (FE) in recessions. The joint movement in both the growth rate and the proportion of bank debt indicates a pronounced shift toward private lenders, suggesting that relationship banking and renegotiation capacity become especially valuable under deteriorating macroeconomic conditions.

In contrast, the public-debt channel exhibits a different pattern. The coefficients for bond debt growth show no significant change during recessions (0.72% in Pooled OLS and 0.71% in FE), indicating that firms do not expand bond issuance when conditions worsen. The statistically significant adjustment occurs in relative terms: Bond Debt % declines sharply in recessions, falling by 8.87 percentage points (Pooled OLS) and 7.99 percentage points (FE). Moreover, this contraction begins before the downturn, as shown by consistently negative and significant coefficients for the pre-recession dummies. This suggests that firms reduce their reliance on public markets possibly as risk premia rise and investor appetite weakens ahead of recessions. Taken together, the results point to a consistent reallocation away from bond financing and toward bank borrowing, with banks acting as the primary source of credit when macroeconomic uncertainty intensifies.

Rationale

Understanding how firms allocate debt between bank loans and public markets is critical for corporate decision-makers, investors, and policymakers alike. For firms, the composition of debt affects cost of capital, refinancing risk, and strategic flexibility, shaping how they respond to economic cycles and financial stress. For investors, shifts between bank and market financing influence the supply of securities, market liquidity, and credit spreads, affecting portfolio risk and valuation. For policymakers, insight into how aggregate debt composition adjusts can inform policies aimed at mitigating the effects of recessions. By examining how non-financial corporations in the S&P 500 index adjust their debt mix across business cycles, this study provides empirical insights into these dynamics, offering guidance for strategic financing, risk assessment, and policy design.

For corporate decision-makers, understanding the dynamics of debt composition is not an abstract academic exercise but a matter of strategic importance. A deep understanding of the cyclical patterns helps corporate chief financial officers (CFOs) decide when to lean on bank relationships and when to diversify into capital markets. For CFO's, managing the balance between bank and market debt is critical, especially during downturns, since diversification across financing channels mitigates rollover risk and ensures access to funding when one source contracts⁶. By documenting how non-financial corporations in the S&P 500 adjusted their debt mix over multiple cycles, this

⁶Adrian, Colla, and Shin (2012).

study provides CFOs and risk managers with an empirical benchmark for strategic financing decisions. While theoretical models emphasize differences between bank and bond financing, evidence on how firms reallocate across these channels during financial crises helps practitioners calibrate their expectations about market behavior. This study provides corporate decision-makers with historical regularities that can be used to design forward-looking financing strategies.

The empirical results of this study translate these strategic considerations into concrete patterns that corporate decision-makers can use. Total borrowing increases more rapidly in recessions imply that firms rely more on external finance when internal liquidity weakens, reinforcing the need for proactive funding strategies. The results further demonstrate that this additional borrowing is driven primarily by banks: both the growth of bank debt and its share in total debt rise significantly during downturns. By contrast, bond financing does not expand in recessions, and its share declines well before downturns begin. For CFOs, this highlights the importance of maintaining strong banking relationships and committed credit lines, as bank financing becomes the dominant and most reliable channel in crisis periods. The heterogeneity results also show that the most financially constrained firms depend the most on banks, relative to not constrained ones. These patterns suggest that firms should tailor their financing strategies to their constraint level and prepare plans for accessing banks versus markets across the business cycle.

For investors, understanding how firms reallocate between bank loans and bond financing over the business cycle is critical for assessing credit market conditions and pricing risk. Changes in debt composition shape not only firm-level risk profiles but also the aggregate supply of securities available to market participants. In particular, reliance on public debt financing determines the volume of issuance and market liquidity, both of which are important for bond valuation during periods of financial distress⁷.

This study shows that the increase in total borrowing during downturns is driven primarily by bank lending rather than expanded market issuance, reinforcing the view that recessions are characterized by a withdrawal from public debt markets rather than a reallocation within them. This implies that aggregate bond issuance declines, leading to a contraction in market liquidity. The heterogeneity analysis indicates that this shift from market-based to bank financing is

⁷ Acharya, Amihud & Bharath (2013).

widespread but varies across firms. The most financially constrained firms, those with limited internal resources or higher costs of accessing external capital, exhibit the strongest substitution toward bank debt. These constraints make them more vulnerable to downturns and more likely to withdraw from public markets, leaving the remaining pool of bond issuers stronger on average. From an investor perspective, the retrenchment from public markets provides a channel through which credit spreads may widen during downturns, even in the absence of a deterioration in average issuer quality. Reduced issuance and thinner trading conditions increase liquidity premia, raising required yields on corporate bonds.

These findings suggest that recessionary widening of credit spreads reflects, at least in part, reduced market liquidity stemming from lower bond issuance. By documenting how firm-level financing choices aggregate into shifts in the supply of public debt, this study provides investors with a clearer framework for interpreting credit market dynamics during periods of economic distress.

The cyclical dynamic is not just a matter of firm-level financing; it determines how aggregate shocks propagate through the economy. The literature on the “credit channel of monetary policy” has long emphasized that shifts in bank lending and bond market conditions jointly influence corporate investment, employment, and growth.⁸ When firms reduce public borrowing in downturns, investment contracts more severely, amplifying recessions. Conversely, the ability to tap bond markets in expansions supports credit supply and strengthens recovery dynamics. The composition of corporate debt, whether tilted toward banks or markets, thus affects not only individual firms but also the transmission of macroeconomic shocks to the broader economy.⁹ Given this importance, the interaction between business cycles and financing choices is worth emphasizing. However, while firm-level financing decisions can in aggregate feed back into macroeconomic cycles, identification strategy in this paper treats recessions as exogenous shocks relative to individual firms. It is reasonable to assume that a single firm’s debt structure has no material influence on the recessions. This mitigates concerns about reverse causality between the business cycle and debt mix decisions.

⁸ Bernanke and Gertler (1995).

⁹ Holmström and Tirole (1997).

Taking recessions as exogenous relative to individual firms, the observed shift from public to private debt in crisis periods has broader implications. For policymakers, it underscores the role of banks as stabilizers in times of downturns, reinforcing the need for robust capital regulation.¹⁰ For central banks, it highlights how the credit channel of monetary policy operates: firms' migration into bank lending makes aggregate outcomes depend on banking system resilience.¹¹ More broadly, it suggests that financial stability frameworks must consider not only total leverage but also its composition, since the debt mix shapes how shocks transmit through the economy.¹²

Literature review

Theoretical framework

Understanding how firms adjust their mix of bank and bond financing over the business cycle requires drawing on several strands of corporate finance theory. These theories differ in their predictions about whether firms rely more on private bank lending or public bond markets in periods of economic stress. Together, they provide the conceptual foundation for interpreting the empirical patterns documented in this thesis.

Since this study focuses on the composition of corporate debt, it is useful to begin by considering how total corporate debt is expected to behave over the business cycle. A natural starting point is Myers' (1984), which posits that firms follow a financing hierarchy: they prefer internal funds first, resort to external debt when internal resources are insufficient, and issue equity only as a last resort due to information asymmetries and issuance costs. In periods of economic downturn, operating cash flows and retained earnings typically contract, reducing the availability of internal financing. Under the Pecking Order framework, this contraction creates a greater reliance on external debt financing. Consequently, the theory implies that firms may increase overall borrowing when earnings decline. Although Pecking Order Theory does not distinguish between different types of debt, it provides a baseline expectation regarding the changes in total debt level in recessions.

¹⁰ Holmström and Tirole (1997).

¹¹ Bernanke, Gertler, and Gilchrist (1999).

¹² De Fiore and Uhlig (2015).

A second line of theory focuses on the role of banks as informed lenders. Diamond (1991) analyzes the choice between bank loans and directly placed debt by focusing on the role of monitoring and borrower reputation. The paper shows that banks add value by monitoring borrowers and mitigating moral hazard. However, banks monitoring is costly. As a result, firms' financing choices depend on their credit quality and reputation: high-quality firms with strong reputations can borrow directly in public markets without monitoring, while firms with intermediate credit quality rely on bank loans where monitoring provides incentives for good behavior. Very low-quality borrowers may be rationed out of both markets. The model implies that the demand for bank loans increases in periods of high interest rates or low expected profitability, when monitoring becomes more valuable even for higher-rated firms.

Holmström and Tirole (1997) further formalize the role of bank monitoring by showing that firms' access to external finance is limited by incentive problems, as entrepreneurs may engage in inefficient investment behavior when they have insufficient internal capital at stake. Consequently, the amount of external funding a firm can raise is tied to its own capital contribution. Bank monitoring mitigates these incentive problems by restricting opportunistic behavior, thereby allowing firms with valuable investment opportunities but limited internal funds to raise more external finance. Because monitoring is costly and requires intermediaries to commit their own capital, bank finance is more expensive than arm's-length market finance and is constrained by banks' balance sheets. As a result, larger and better-capitalized firms can rely on market-based financing, while smaller or capital-constrained firms depend on bank lending. For the purposes of this study, this framework is particularly relevant because it highlights that banks' lending capacity is inherently constrained and may contract during crises, implying that the supply of bank credit can shrink which has largest effect on small, young financially-constrained firms.

Bolton and Freixas (2000) build on these insights by developing an equilibrium model in which bank debt and bond financing coexist as a result of serving distinct functions under asymmetric information. In their framework, banks' ability to monitor borrowers and acquire private information allows them to screen firm quality, but also makes bank lending more costly due to intermediation expenses. In equilibrium, safer firms with good reputation use bond markets to avoid these costs, while smaller, younger, or riskier firms rely on bank loans because monitoring enables financing that would not be feasible through arm's-length markets. In the context of

economic downturns, this trade-off has direct implications for debt composition. During time of increased insecurity, firms may place a higher value on banks monitoring, making them more willing to shift from market-based financing toward bank debt even at a higher price. However, when intermediation costs rise or banks become funding-constrained, conditions that are likely to intensify during crises, some firms that would otherwise prefer bank loans may instead be pushed toward bond markets. Taken together, the model delivers opposing predictions for debt composition in downturns, making it especially well-suited to motivate an empirical analysis.

The renegotiation perspective further reinforces banks' value during periods of stress. Bolton and Scharfstein (1996) study implies how the concentration of debt affects firms' incentives and outcomes in financial distress. They show that borrowing from a small number of creditors, such as banks, facilitates renegotiation and provides greater financial flexibility, but weakens ex ante discipline because firms anticipate softer enforcement in distress. In contrast, dispersed debt strengthens commitment by making renegotiation difficult, at the cost of inefficient liquidation. This framework is important for the present analysis because it characterizes banks as flexible lenders with whom renegotiation is easier, implying that firms may prefer bank financing in periods of heightened uncertainty or economic downturns when the likelihood of distress increases.

Collectively, these theories offer competing predictions about debt structure adjustments over the business cycle. Some frameworks, particularly those emphasizing monitoring and renegotiation, predict that firms shift toward bank debt in downturns. Others imply that when banks face balance-sheet pressure, firms substitute toward public debt. This theoretical ambiguity underscores the need for empirical evidence. By studying how firms adjusted their private and public borrowing across two major recessions, this thesis directly tests which mechanisms dominate in practice. The combination of these theories provides the conceptual foundation for interpreting the direction, magnitude, and heterogeneity of the debt reallocation documented in the empirical analysis.

Empirical evidence

Halling, Yu, and Zechner (2016) study changes in debt composition during recessions, specifically firms' reliance on private (bank) debt versus public (bond) debt. The main objective is to understand how debt structure evolves over time, whether firms rely more on bank or bond financing during downturns, and why firms respond differently to adverse economic conditions.

To address these questions, the authors use firm-level data, combining balance-sheet information with detailed data on different debt instruments. They classify years into expansions and recessions and estimate panel regressions with firm fixed effects. The analysis focuses on periods in which firms actively adjust their debt, allowing the authors to study deliberate financing choices rather than passive balance-sheet movements. The results show that corporate debt structure changes significantly over the business cycle. Namely, approximately 40% of firms reallocate their borrowing toward private debt while reducing overall leverage, whereas the remaining 60% increase leverage and expand their financing mix by supplementing public debt with private debt. Firms in the latter group are generally larger, more profitable, dividend-paying, rated, characterized by fewer growth opportunities, and hold lower cash balances. Firms in the former group display the opposite characteristics, consistent with the notion that access to public debt markets becomes relatively more costly or less attractive for these firms during recessions. Overall, the paper implies that differences in financial strength and market access can explain why firms adjust their debt structure in different ways during recessions. While some firms are able to continue borrowing and adjust their financing mix, others face tighter constraints and are forced to scale back, particularly on bond financing.

Adrian, Colla, and Shin (2012) study which financial frictions were most important during the Global Financial Crisis of 2007–09. Despite the common view that financial crises are characterized by a pronounced contraction in the quantity of credit, the authors show that total credit to firms did not collapse during the crisis. Instead, the main adjustment occurred through a change in the composition of credit, with bank lending falling sharply and bond financing expanding. Using both aggregate U.S. Flow of Funds data and firm-level issuance data, the paper documents a strong substitution from bank loans to bonds among firms with access to public debt markets. At the same time, credit spreads on both loans and bonds increased substantially, indicating that the crisis operated primarily through higher risk premia. These patterns are consistent with a negative shock to bank credit supply driven by balance-sheet constraints and deleveraging in the banking sector.

The both papers highlights the importance of distinguishing between different financing channels and shows that changes in debt composition can be more informative than changes in total debt volumes.

Methodology

Data

The aim of this thesis is to examine how corporate debt structure changes over the business cycle. To answer this, I employ a panel dataset of S&P 500 non-financial firms from 2003 to 2023 and analyze debt composition around two recession periods¹³. I focus on S&P 500 non-financials to ensure consistency of reporting and comparability across firms. This sample provides long time coverage, a broad cross-section of industries, and sufficient bond and loan issuance data to capture meaningful variation in debt structure.

The sample is constructed from firms listed in the S&P 500 index, restricted to companies with primary operations geographically based in the United States¹⁴. To ensure comparability, all firms belonging to the financial sector were excluded, as their capital structures are not directly comparable to those of non-financial firms. Applying these filters reduced the sample from the original 500 firms to 397 companies.

The sample can be considered representative because it covers firms from a broad range of industries. It spans technology sectors such as software, semiconductors, and communications equipment; health care sectors including pharmaceuticals, biotechnology, and medical equipment; and industrial firms engaged in aerospace, transportation, and construction. Energy and utilities are also well represented, from oil and gas producers to electric and multi-utilities, alongside companies in consumer staples and consumer discretionary industries such as food, beverages, retail, hotels, and restaurants. In addition, the dataset includes a significant number of real estate firms and companies in materials, media, and entertainment. This diversity ensures that the analysis captures debt structure dynamics across different segments of the economy rather than being driven by a single sector.

¹³ According to the National Bureau of Economic Research (NBER), the U.S. economy experienced the Great Recession from December 2007 to June 2009 and the Coronavirus Recession from February to April 2020.

¹⁴ The sample comprises non-financial firms that were included in the S&P 500 index at the time of sample construction (Q3 2025). Financial data are observed for these firms from 2003 to 2023, irrespective of their S&P 500 membership status during the full sample period.

Variables

The quarterly data used in this study are obtained from the S&P Capital IQ database. The analysis focuses on regression models based on the two key forms of corporate debt: Bank Debt (Private Debt) and Bond Debt (Public Debt). Bank Debt is defined as the sum of outstanding revolving credits and term loans. Bond Debt comprises of outstanding senior and subordinated bonds and notes, representing the total principal value of a firm's bond market obligations. It should be noted that they do not exhaustively cover Total Debt, as reported by S&P Capital IQ. Excluded categories include commercial paper, finance lease obligations, convertible debt, and other miscellaneous borrowings.

The empirical analysis comprises five regression specifications. The first three dependent variables are defined as the first differences of the natural logarithms of total debt, bank debt, and bond debt, denoted as $\Delta \ln(\text{Total Debt})$, $\Delta \ln(\text{Bank Debt})$, and $\Delta \ln(\text{Bond Debt})$. Given the quarterly frequency of the data and the relatively small magnitude of changes over short horizons, these log differences are interpreted as approximate growth rates of the respective debt components.

Examining changes in total debt provides a natural starting point for the analysis, as it captures firms' overall borrowing responses during periods of economic stress. Disaggregating total debt into bank and bond components then allows for a more granular assessment of how firms adjust specific sources of external finance over the business cycle. The growth rates of bank and bond debt in particular offer direct evidence on whether adjustments during recessions occur through expansions or contractions in individual financing channels.

In addition, the analysis incorporates two variables measuring the composition of corporate debt, defined as the ratios of Bank Debt and Bond Debt to Total Debt. These variables capture the relative importance of private (bank-based) and public (bond-based) financing in firms' capital structures. While changes in debt shares alone do not reveal whether shifts in composition arise from increases in one debt type or decreases in another, their joint interpretation with the growth-rate regressions provides complementary information. For instance, a decline in the bond debt share during recessions, even in the absence of significant changes in bond debt growth, indicates a reduction in the relative role of bond financing compared with other sources of borrowing. Taken together, this combined approach offers a more complete picture of how firms adjust both the level and composition of debt in response to economic downturns.

To analyze how the dependent variables evolve during periods of economic stress, I introduce a set of dummy variables. The first is a Recession dummy, which takes the value of one for all quarters classified as recession periods. In addition, I construct four Pre-Recession dummies, capturing the quarters leading up to a recession. These indicators correspond to one, two, three, and four quarters prior to the official onset of a recession, respectively.

To capture firm-level financial constraints, this study employs the Kaplan–Zingales (KZ) index, following Kaplan and Zingales (1997) and Lamont, Polk, and Saa-Requejo (2001). The index combines several firm characteristics, such as cash flow, leverage, dividends, cash holdings, and Tobin’s Q, into a single measure that ranks firms according to the severity of their financial constraints. In the empirical construction, cash flow (defined as net income adjusted for depreciation), as well as cash holdings and dividend payments are scaled by lagged Property, Plant, and Equipment (PPE) to ensure comparability across firms¹⁵. Higher values of the KZ index indicate that a firm is more financially constrained, while lower values suggest that a firm has easier access to external finance.

To study firms’ heterogeneity, the Kaplan–Zingales (KZ) index is used to classify firms into quartiles of financial constraints from Q1 being labeled “no constraint” to Q4 “high constraint”. Dividing firms into quartiles of the KZ index provides a straightforward way to capture variation in financing frictions across the sample. This classification allows the analysis to compare how firms with different levels of financial constraint adjust their debt structures. By accounting for firms’ constraint level, the study provides a clear picture of how financing constraints shape both the level and the composition of corporate debt.

To examine whether level of constraint leads corporations to respond differently to recessions, I included interaction terms between the KZ index (from KZ - Q1 to KZ - Q4) and the Recession dummy. These terms capture whether the debt structure adjustments around downturns are systematically larger or smaller for constrained firms compared to unconstrained ones. The coefficients for interaction terms are predominantly not statistically significant. This suggests that, in this sample, financial constraints do not materially alter the cyclical pattern of debt composition. Instead, the observed dynamics seem to reflect aggregate effects of recessions across firms. The absence of statistically significant interaction effects between the KZ index and recession or pre-

¹⁵ Formula used for calculation: $KZ\ index = -1.002 \times Cash\ Flow / PPE + 0.283 \times Tobin's\ Q + 3.139 \times Leverage - 39.368 \times Dividends / PPE - 1.315 \times Cash\ and\ Cash\ Equivalents / PPE$.

recession dummies may stem from sample choice. Since the analysis focuses exclusively on S&P 500 firms, known for their strong credit profiles and ease of access to public capital markets, even firms classified as the most financially constrained by the KZ index may still be less impacted by funding frictions. Consistent with findings by Chen & Lin (2018), membership in the S&P 500 correlates with reduced financial constraints. While the lack of significance in the interaction terms may reflect the fact that S&P 500 firms are generally strong and less financially constrained, focusing on this sample remains valid since it covers large number of firms across multiple industries, which use both financing channels. It should be noted that the KZ index is not included as a regressor when the dependent variable is Total Debt. The reason is that the index itself is partly constructed using leverage, which creates a mechanical correlation between the explanatory and dependent variable.

The model includes several firm-level controls to account for heterogeneity in company characteristics that may influence financing behavior. Firm size is captured by *log_total_assets*, which represents the natural logarithm of Total Assets. This transformation was necessary because unit root tests indicated non-stationarity in the raw total asset series. The logarithmic specification reduces skewness and allows the interpretation of changes in percentage terms. Proxy for capital structure in this study is *debt_to_equity*, defined as ratio dividing debt level with level of equity. This control is omitted from the total debt specification for the same reasons underlying the exclusion of the KZ index. Finally, firm profitability and operating scale are proxied by *revenue_to_assets* ratio.

In addition to firm-level characteristics, the regressions incorporate macroeconomic controls to account for shifts in the broader economic environment that may influence corporate financing choices. The first is *gdp_pch*, which measures the percentage change in real GDP compared the same quarter one year ago. This variable reflects overall economic conditions. Inflationary pressures are controlled for through Consumer Price Index¹⁶. *d_cpi* represents the first difference of the Consumer Price Index. Differencing was necessary because unit root tests showed that the original CPI series was non-stationary, while the transformed series is stationary and suitable for regression analysis. Inflation may affect firms in different ways, which is why this is necessary control variable. Moderate inflation can reduce the real burden of debt. High inflation, however,

¹⁶ Scale value to 100 for end of 2009 Q2-ending of recession.

can increase borrowing costs. Finally, the interest rate environment is represented by market yield on U.S. Treasury Securities at 10-year constant maturity, quoted on an investment basis. d_T_bill measures the first difference of the 10-year U.S. Treasury yield. Like CPI, the Treasury yield was differenced following unit root test results. This variable serves as a proxy for shifts in monetary policy and long-term financing costs, both of which directly affect the availability and attractiveness of corporate borrowing.

The firm-level and macroeconomic controls provide a comprehensive framework for isolating the effect of recessions on corporate debt structures. The firm-level variables account for differences in size, capital structure, and profitability, while the macroeconomic variables capture the broader environment of growth, inflation, and interest rates. By including both sets of controls in the regressions, the analysis ensures that the estimated effects of recessionary periods are not confounded by underlying firm fundamentals or prevailing macroeconomic conditions.

Descriptive statistics

Table 1. below presents the descriptive statistics for the continuous variables used in the analysis, excluding dummy variables. The table reports the number of observations, mean, standard deviation, and the minimum and maximum values for each variable. These statistics provide an overview of the central tendency, dispersion, and range of the data, and serve as a first indication of the properties of the sample.

Debt growth rates exhibit small average changes but substantial dispersion. While mean values of growth rates are modest, the standard deviations and wide ranges indicate considerable heterogeneity across firms and quarters. Relative debt share variables indicate that bond financing represents the dominant share of total debt on average, while bank debt accounts for a smaller fraction. The dispersion in these variables highlights meaningful heterogeneity in firms' financing mix across firms and over time.

As the final sample consisted of 397 companies, the initial number of firm-quarter observations would amount to 33,348. However, due to limitations in data availability, large percent of observations are missing. Missing data of this magnitude are common in corporate finance research, as not all firms report detailed debt structure information each quarter, and many do not issue or adjust debt continuously. Consequently, gaps in reporting and variation in disclosure

practices naturally reduce the number of usable observations, without undermining the representativeness of the overall sample.

Table 1. Descriptive Statistics

variable	unit	count	mean	variance	sd	min	max
d_log_total_debt	percentage change per period $\Delta\%$	28,492	0.02	0.11	0.34	-6.42	6.81
d_log_bank_debt	percentage change per period $\Delta\%$	13,321	-0.01	0.60	0.77	-6.89	7.76
d_log_bond_debt	percentage change per period $\Delta\%$	29,000	0.03	0.22	0.47	-6.85	6.57
bank_debt_pct	percentage (%)	16,694	12.61	386.45	19.66	0.00	100.00
bond_debt_pct	percentage (%)	16,694	71.81	635.72	25.21	0.00	100.00
log_total_assets	unitless	30,541	16.22	2.23	1.49	8.95	20.56
revenue_to_assets	percentage (%)	30,150	21.63	337.82	18.38	-24.14	120.12
debt_to_equity	percentage (%)	26,486	90.77	5,619	74.96	.001	394.17
gdp_pct	percent change (%)	33,348	2.18	4.98	2.23	-7.50	12.20
d_cpi	unitless (change in index points)	32,951	0.70	0.60	0.77	-2.35	3.19
d_t_bill	percentage points change	32,951	0.01	0.13	0.35	-0.79	0.98

When transforming Total Debt into logarithmic form, 1,577 observations were excluded due to zero values. A similar issue arises for Bank Debt: constructing *d_log_bank_debt* required dropping 7,451 observations with non-positive values. The same transformation was applied to construct *d_log_bond_debt*, although the reduction in sample size was smaller because zero values were less frequent. First-difference transformations further reduce the sample, as one observation per firm is mechanically lost in the initial period. With 397 firms, this results in an additional loss of 397 observations.

I also remove observations that are economically implausible. Specifically, 1,806 observations of *bond_debt_pct* and 205 observations of *bank_debt_pct* are excluded because the respective shares exceed 100%. Since the combined share of bank and bond debt cannot exceed total debt, I additionally exclude cases where their sum violates this constraint, leading to the removal of 4,260 observations for *bond_debt_pct* and 5,454 for *bank_debt_pct*. After these adjustments, the final sample for both variables consists of 16,694 observations.

The number of observations for both micro- and macro-level control variables varies across specifications because of differences in data coverage and transformation requirements. Logarithmic transformations necessitate strictly non-zero values, while first-difference constructions require consecutive time-series observations, both of which contribute to additional sample attrition.

Regression models

To examine how firms adjust their debt structure over the business cycle, this study employs firm-level panel regressions. Regression analysis relates an outcome variable to a set of explanatory variables, allowing the effect of a given factor to be assessed while holding other variables constant. The panel structure exploits both cross-sectional variation across firms and time-series variation within firms, providing a natural framework for analyzing corporate financing decisions across expansions and recessions. Accordingly, the empirical analysis relies on panel regression models to capture the dynamics of debt adjustment over time.

To address concerns of model specification, I conducted several diagnostic tests. The Breusch–Pagan test indicated the presence of heteroskedasticity, and the Wooldridge test pointed to first-order autocorrelation. Given these features of the data, all regressions are estimated with standard errors clustered at the firm level, which allows for heteroskedasticity across firms and correlation of errors within firms over time, ensuring reliable statistical inference. Hausman tests were conducted for each specification and consistently reject the null hypothesis that firm-specific effects are uncorrelated with the regressors, indicating that the random effects estimator is inconsistent. This result is economically intuitive, as the explanatory variables: debt growth rates and the relative composition of bank and bond financing, are closely linked to persistent, unobserved firm characteristics such as financing strategy, reputation, and risk preferences. Accordingly, all baseline results are estimated using firm fixed effects, and random effects specifications are excluded.

Total Debt Growth

I began analysis with regressing $d_log_total_debt$ or $\Delta \ln(\text{Total Debt})$ on recession and pre-recession dummies along with controls. This regression is implemented to show how total level of overall firm debt changes across business cycle. It is a first step that should point in which direction corporate borrowing goes during downturns. Results from Pooled OLS and FE regression are presented in *Table 2*. The FE and Pooled OLS estimates are similar in magnitude and consistently display the same sign, which suggests that the chosen models provide a reliable representation of the underlying relationships.

The key takeaway from the regression results is the positive and statistically significant coefficient on the recession dummy, indicating that firms increase their total debt by approximately 1.8% (Pooled OLS) and 2.7% (FE) more per quarter during recessions relative to expansion periods. When the recession materializes, firms significantly increase their debt, consistent with the view that downturns compress internal cash flows and raise the need for external financing to sustain operations and investment. In principle, higher uncertainty could lead firms to reduce leverage and adopt more conservative financing policies. However, for large S&P 500 firms, the evidence favors the former channel: their relatively low default risk and continued access to debt markets allow them to expand borrowing in recessions to finance ongoing operations and investment needs.

As coefficients are positive for pre-recession dummies, it is implied that total debt increases more in quarters leading to recession, although they are mostly do not display statistical significance. The exception are the coefficients for *pre_recession4* is both high and significant, 7.5% (Pooled OLS) and 7.21% (FE), however, the underlying mechanism driving this relationship remains unclear. In the quarter immediately leading up to the recession, debt growth increases with weak statistical significance.

The control variables behave largely in line with economic intuition. Coefficient of *log_total_assets* is positive, although statistically insignificant, reflecting the fact that larger firms tend to operate at a greater scale and have higher borrowing capacity as well as better access to external financing. In contrast, a 1% increase in *revenue_to_assets* ratio is associated with an approximately 0.4% (Pooled OLS and FE) decrease in debt change with high significance, which is consistent with the notion that more profitable firms rely less on external financing and can fund a larger share of their activities through internal cash flows. There is a modest positive association

between debt and macroeconomic conditions, as proxied by GDP growth, indicating that stronger economic activity is associated with slightly higher borrowing. The estimated coefficient on inflation is negative, consistent with the view that higher inflation is associated with higher nominal borrowing costs. The negative coefficient on the risk-free rate is economically intuitive, as higher interest rates increase borrowing costs and discourage debt issuance.

Table 2.¹⁷ - Results from Total Debt growth rate regression

VARIABLES	Pooled OLS $\Delta \ln(\text{Total Debt})$	FE $\Delta \ln(\text{Total Debt})$
recession	0.0177** (0.0070)	0.0268*** (0.0070)
pre_recession1	0.0225* (0.0129)	0.0214* (0.0129)
pre_recession2	0.0111 (0.0086)	0.0121 (0.0086)
pre_recession3	0.0185 (0.0148)	0.0211 (0.0146)
pre_recession4	0.0750*** (0.0154)	0.0721*** (0.0151)
log_total_assets	0.0007 (0.0014)	0.0057 (0.0067)
revenue_to_assets	-0.0040*** (0.0001)	-0.0039*** (0.0010)
gdp_pct	0.0017** (0.00079)	0.00317*** (0.00078)
d_cpi	-0.0014 (0.0029)	-0.0071** (0.0031)
d_t_bill	-0.0153** (0.0066)	-0.0129** (0.0065)
Constant	0.0144 (0.0243)	0.0078 (0.1230)
Observations	28,068	28,068
R-squared	0.003	0.009

¹⁷ Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at the firm level are reported in parentheses.

Bank Debt and Bond Debt Growth

To examine how firms adjust their financing strategies during downturns, I estimate two separate models with the growth rates of bank debt and bond debt as dependent variables ($\Delta \ln(\text{Bank Debt})$ and $\Delta \ln(\text{Bond Debt})$). These specifications capture whether the growth rate of each debt type increases or decreases in recessions, thereby providing direct evidence on which channel firms rely more heavily under adverse economic conditions. Analyzing the dynamics of bank and bond borrowing separately makes it possible to identify the drivers of changes in corporate debt and to evaluate the relative importance of private versus public financing during downturns.

The results presented in *Table 3* indicate that firms increase their bank debt by approximately 29.2% (Pooled OLS) and 31.4% (FE) more per quarter during recessions than in expansion periods, with statistical significance at the 1% level (99% confidence). By contrast, the coefficients in the $\Delta \ln(\text{Bond Debt})$ model are not statistically significant, suggesting that the level of public debt does not grow differently in recessions compared to expansions. Taken together, these findings imply that increase in total debt observed during recessions is primarily driven by growth in bank borrowing rather than bond issuance.

The results reveal a negative and statistically significant relationship between bank debt growth and the pre-recession indicator one quarter ahead, suggesting that firms reduce bank borrowing in anticipation of an upcoming recession. A similar pattern is observed for bond debt growth, although statistically insignificant. Two quarters prior to the recession, all estimated coefficients are statistically insignificant, implying the absence of pronounced adjustments in debt growth at that horizon. For bank debt growth, the coefficients associated with three and four quarters before the recession are also insignificant, indicating that bank borrowing is not reduced far in advance of the downturn. In contrast, bond debt growth exhibits more variation: it declines three quarters before the recession but increases one year prior to its onset. Overall, the results do not reveal a consistent or statistically significant pattern in debt composition during the pre-recession quarters for either financing channel.

The coefficients on the financial-constraint indicators kzq_2 (low constraint firms) to kzq_4 (high constraint firms) capture the relationship between debt growth rates and firms' degree of financial constraint. Bond debt growth is higher by approximately 1.9% (Pooled OLS) and 3.13% (FE) for firms in kzq_2 relative to the not constrained firms, while the corresponding coefficients for bank

debt growth are negative and statistically insignificant. Bank debt growth for the most constrained firms (*kzq_4*) is positive and exhibits marginal statistical significance, amounting to an increase of approximately 8.37% (FE). This pattern suggests that highly constrained firms may rely more strongly on private borrowing, consistent with limited access to public debt markets and greater dependence on bank financing.

To examine whether firms with different degrees of financial constraints adjust their financing differently during recessions, interaction terms between the recession indicator and KZ quartile dummies are included, with results reported in Appendix *Table 5*. For firms in KZ–Q2 and KZ–Q3, the interaction coefficients for both bank and bond debt growth are statistically insignificant, indicating no meaningful difference relative to unconstrained firms in their recessionary borrowing behavior. In contrast, for the most constrained firms (KZ–Q4), bank debt growth increases significantly during recessions relative to KZ–Q1, while bond debt growth is negative but statistically insignificant. Overall, the results suggest that any heterogeneity across constraint levels is driven primarily by bank borrowing among highly constrained firms, consistent with the notion that limited access to public debt markets leads these firms to rely more heavily on bank finance in periods of economic stress. At the same time, the absence of statistically significant effects for bond debt growth across most specifications indicates that differences in market-based borrowing are less pronounced.

The central takeaway from these results is that cyclical changes in corporate borrowing operate primarily through bank financing rather than public debt markets. Firms expand bank borrowing significantly during recessions, while bond debt does not exhibit a comparable increase, indicating that the rise of total debt observed in downturns reflects a reallocation toward bank debt rather than increased financing through capital markets. This pattern underscores the pivotal role of banks as financing intermediaries during periods of economic stress. From a policy perspective, it highlights the importance of a resilient banking sector: when firms migrate toward bank lending as bond markets weaken, aggregate credit conditions become increasingly dependent on banks' balance sheet strength and regulatory capital buffers.

Table 3.¹⁸ Results from Bank Debt growth rate and Bond Debt growth rate regressions

VARIABLES	Pooled OLS		FE	
	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$
recession	0.2920*** (0.0511)	0.0072 (0.0228)	0.3140*** (0.0532)	0.0071 (0.0235)
pre_recession1	-0.0999* (0.0551)	-0.0039 (0.0255)	-0.1030* (0.0554)	-0.0065 (0.0256)
pre_recession2	-0.0803 (0.0628)	0.0343 (0.0280)	-0.0743 (0.0634)	0.0322 (0.0282)
pre_recession3	0.0565 (0.0659)	-0.0608** (0.0283)	0.0618 (0.0661)	-0.0621** (0.0284)
pre_recession4	0.0139 (0.0684)	0.0492** (0.0220)	0.0145 (0.0697)	0.0460** (0.0222)
kzq_2	-0.0023 (0.0212)	0.0191** (0.0077)	-0.00171 (0.0309)	0.0313*** (0.0118)
kzq_3	0.0177 (0.0221)	0.0021 (0.0087)	0.0260 (0.0397)	0.0208 (0.0192)
kzq_4	0.0409* (0.0249)	0.0182 (0.0093)	0.0837* (0.0511)	0.0481 (0.0239)
log_total_assets	-0.0005 (0.0050)	0.0012 (0.0024)	-0.0168 (0.0209)	0.0025 (0.0094)
revenue_to_assets	-0.0007** (0.0003)	-0.0001 (0.0001)	-0.0069*** (0.0022)	-0.0001 (0.0008)
debt_to_equity	-0.00005 (0.0001)	-0.00001 (0.0000)	0.00001 (0.0002)	0.00003 (0.0001)
gdp_pct	0.0297*** (0.0042)	-0.0007 (0.0014)	0.0307*** (0.0043)	-0.0003 (0.0014)
d_cpi	-0.0164 (0.0131)	-0.0127* (0.0066)	-0.0188 (0.0137)	-0.0142** (0.0070)
d_t_bill	-0.0017 (0.0314)	-0.0011 (0.0167)	0.0012 (0.0318)	-0.0010 (0.0168)
Constant	-0.0586 (0.0846)	0.0122 (0.0416)	0.307 (0.3660)	-0.0272 (0.1680)
Observations	8,586	14,755	8,586	14,755
R-squared	0.010	0.002	0.012	0.002

¹⁸ Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at the firm level are reported in parentheses.

From a theoretical standpoint, the findings align closely with models that stress the value of bank intermediation under heightened uncertainty. Diamond (1991) and Bolton and Freixas (2000) emphasize banks' monitoring and information advantages, which become particularly valuable when expected profitability declines and moral hazard concerns intensify, even if such monitoring is costly. Similarly, the renegotiation framework of Bolton and Scharfstein (1996) highlights banks' contractual flexibility, making them preferred lenders when the likelihood of financial distress rises. While Holmström and Tirole (1997) note that bank lending capacity may itself be constrained during crises, the observed shift toward bank debt in this sample, comprised of large S&P 500 firms, suggests that firms with sufficient scale and credit quality are able and willing to bear higher intermediation costs in exchange for the benefits of relationship lending. Finally, the results are in line with and provide additional support for the evidence in Halling, Yu, and Zechner (2016) regarding firms' increased reliance on bank debt in downturns.

Bank Debt Share and Bond Debt Share

Having established that total debt rises in recessions, primarily driven by bank borrowing, I now turn to the question of how this affects the relative weight of bank versus bond financing. To address this, two models are estimated with the share of bank debt in total debt (Bank Debt %) and the share of bond debt in total debt (Bond Debt %) as dependent variables shown in *Table 4*. These specifications capture how the balance between private and public debt shifts during downturns, offering direct evidence on which type of financing firms rely more when economic conditions deteriorate. By focusing on debt shares rather than growth rates, the analysis provides useful addition to paint a clearer picture of substitution patterns of corporate debt structure during financial crisis.

For the recession dummy, the effect is both economically meaningful and highly significant: the share of bank debt in total debt rises by about 3 percentage points (3.026pp in Pooled OLS and 3.234 pp in FE) in recession periods comparing to expansions. On the other hand, the share of bond debt falls by roughly 8 percentage points (−8.869pp in Pooled OLS and -7.999pp in FE). This indicates that in downturns firms systematically rebalance their financing mix, shifting away from bond markets and toward bank borrowing. Turning to the pre-recession dynamics, the pattern is asymmetric across debt types. For bank debt, coefficients are insignificant across all pre-recession quarters (with the exception of a weak negative effect of 0.99pp in FE for *pre_recession2*),

suggesting that bank share do not change much until the recession is underway. In contrast, bond debt share declines significantly already before recessions. In FE specification leading to recession share of bonds decrease from 2.122 percentage points a year before recession to 4.336 percentage points quarter to recession. Similar pattern is observed in OLS specification. This implies that reliance on public markets starts contracting well in advance, whereas bank borrowing becomes more relevant only once the recession materializes. These findings additionally support for results in previous models. Namely, across this sample firms firm favored private over public financing during downturns.

Additionally, the results highlight the role of financial constraints. For KZ - Q2, coefficients are positive and insignificant across both debt types, except weak positive effect for bank share in Pooled OLS, indicating little difference from unconstrained firms. For KZ - Q3, the models show a significant increase in Bank Debt % (4.448pp in Pooled OLS and 3.263pp in FE), while the bond share coefficient under FE specification shows decrease of 3.832, suggesting that moderately constrained firms tend to lean more on banks. The strongest effects are observed for KZ - Q4: the most constrained firms have higher bank debt share substantially compared to no-constraint firms (12.22pp in Pooled OLS and 7.035pp in FE) and simultaneously lower bond share (-8.596 in Pooled OLS and -8.972 in FE), all highly significant. This pattern demonstrates that highly constrained firms on average rely strongly on bank borrowing and less on public debt as financing channel.

The interaction term regressions provide limited evidence of strong heterogeneity across financial constraint levels in the cyclical adjustment of debt composition. Across all KZ quartiles, the recession interaction terms are positive for bank debt share and negative for bond debt share, indicating that firms shift toward bank financing during recessions regardless of their degree of financial constraints. While the most constrained firms rely more heavily on private debt relative to public debt than not constrained firms, this difference appears to reflect persistent financing patterns rather than differential cyclical responses. Although the bond debt share of the most constrained firms declines less during recessions, evidence from bond debt growth regressions (Appendix *Table 5*.) suggests that these firms do not increase bond financing and, if anything, reduce it, albeit in a statistically insignificant manner. Consequently, the larger decline in bond share among unconstrained firms is driven by their greater reliance on market-based financing in

general. Taken together, the results suggest that recessionary adjustments in debt composition are broadly similar across constraint levels, with no clear or monotonic pattern across KZ quartiles.

Table 4.¹⁹ Results from Bank Debt share and Bond Debt share regressions

VARIABLES	Pooled OLS		FE	
	Bank Debt%	Bond Debt%	Bank Debt%	Bond Debt%
recession	3.026*** (0.8450)	-8.869*** (1.4620)	3.234*** (0.7350)	-7.999*** (1.2500)
pre_recession1	-0.134 (0.7420)	-5.015*** (1.2660)	-0.979 (0.6060)	-4.336*** (1.1130)
pre_recession2	-0.941 (0.7030)	-4.612*** (1.2790)	-0.990* (0.5670)	-4.629*** (1.1130)
pre_recession3	-0.569 (0.7250)	-4.266*** (1.2120)	-0.021 (0.6030)	-4.063*** (1.1060)
pre_recession4	-0.197 (0.7610)	-2.808** (1.1530)	-0.525 (0.6260)	-2.122** (1.0330)
kzq_2	2.299* (1.187)	0.444 (1.799)	1.443 (0.900)	-1.702 (1.669)
kzq_3	4.448*** (1.712)	-0.839 (2.321)	3.263** (1.268)	-3.832* (2.250)
kzq_4	12.22*** (2.415)	-8.596*** (3.095)	7.035*** (1.722)	-8.972*** (2.935)
log_total_assets	-4.766*** (0.646)	1.932** (0.858)	-3.885*** (1.143)	6.136*** (1.522)
revenue_to_assets	0.012 (0.034)	-0.112** (0.051)	-0.064 (0.050)	0.228** (0.115)
debt_to_equity	-0.026*** (0.008)	-0.0037 (0.012)	-0.0057 (0.006)	0.0065 (0.015)
gdp_pct	0.006 (0.056)	-0.077 (0.106)	0.096** (0.046)	-0.079 (0.095)
d_cpi	-1.222*** (0.306)	0.493 (0.543)	-1.550*** (0.262)	0.128 (0.454)
d_t_bill	0.521 (0.354)	-0.756 (0.665)	0.576* (0.308)	-0.524 (0.611)
Constant	87.71*** (11.480)	48.49*** (14.920)	74.34*** (19.410)	-28.55 (26.610)
Observations	11,817	11,817	11,817	11,817
R-squared	0.170	0.047	0.059	0.040

¹⁹ Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at the firm level are reported in parentheses.

Overall, the evidence points to a shift in the composition of corporate debt over the business cycle. Firms appear to scale back their reliance on public debt markets already in the periods preceding recessions, while the relative importance of bank financing increases once downturns unfold. During recessions, the share of bank debt rises and the share of bond debt declines, suggesting a rebalancing toward private lending rather than a uniform contraction across financing sources. Importantly, this pattern is largely similar across firms with different degrees of financial constraints, with the interaction regressions offering limited evidence of systematic differences across KZ quartiles. Taken together, these findings are consistent with the view that, under heightened uncertainty, firms place greater weight on bank finance, likely reflecting banks' informational advantages and contractual flexibility, while access to public debt markets weakens.

Limitations

Despite providing systematic evidence on how firms adjust their debt structure across business cycles, the analysis is subject to several limitations. First, the dataset consists exclusively of S&P 500 non-financial firms, which are large, well-established corporations with strong credit profiles and broad access to capital markets. As such, the findings may not generalize to smaller, private, or more financially constrained firms, which rely more heavily on bank lending and face greater sensitivity to financing frictions.

Second, the construction of the debt variables introduces measurement constraints. Capital IQ does not decompose Total Debt into mutually exclusive categories, and several components—such as commercial paper, finance leases, and convertible debt—are excluded from both bank and bond debt definitions. As a result, Bank Debt and Bond Debt do not fully sum to Total Debt, meaning that changes in overall leverage and changes in debt composition may not always move proportionally. Additionally, transforming debt variables into logarithmic differences requires excluding all zero observations, reducing the sample size and potentially introducing selection bias if firms with zero bank or bond balances systematically differ from those with positive values.

Third, missing data represent a practical and methodological limitation. A substantial number of firm-quarter observations are unavailable, particularly for bank-debt disclosures. This reduces the statistical power of the regressions and may bias results if missingness is not random. Although

such gaps are common in corporate finance datasets, uneven reporting of bank and bond debt affects the precision with which debt dynamics can be estimated.

Fourth, the analysis focuses on changes in debt growth rates and shares of debt, but does not incorporate pricing- or contract-level information such as interest spreads, covenant tightness, or maturity structures. Without these details, it is difficult to distinguish whether increases in bank borrowing reflect new lending, renegotiations of existing facilities, or the utilization of pre-committed credit lines. Incorporating such information would provide a more granular understanding of how financing conditions evolve during recessions.

Fifth, while the analysis documents systematic reallocation of debt across financing sources, it does not allow for definitive conclusions regarding the underlying reasons for these adjustments. In particular, the empirical framework does not distinguish whether the observed shift toward bank financing reflects supply-side factors, such as changes in banks' lending behavior, monitoring intensity, or contractual flexibility, or demand-side factors, such as firms' responses to higher costs of market-based debt, increased risk premia, or some other factors. As a result, the current specifications identify changes in debt composition but do not directly uncover the mechanisms driving firms' financing choices.

Taken together, these limitations do not undermine the core findings but highlight avenues for stronger identification and richer data in future research, including broader firm samples, better coverage of debt components, and contract-level detail on financing conditions.

Conclusion and Future Work

This thesis examined how corporate debt structure responds to business cycle fluctuations by estimating a set of panel regressions using quarterly data for U.S. non-financial S&P 500 firms over the period 2003–2023. The empirical approach was designed to capture debt dynamics along multiple dimensions, combining growth-rate regressions for total debt, bank debt, and bond debt with composition regressions measuring the shares of bank and bond debt in total borrowing. By incorporating recession and pre-recession indicators, firm-level controls, macroeconomic variables, and heterogeneity by financial constraints, the framework provides a comprehensive view of how firms adjust both the level and structure of debt around economic downturns.

The analysis begins with total debt growth and shows that firms increase overall borrowing during recessions across the sample. Total debt grows significantly faster in downturns than in expansion periods, consistent with theory that firms rely more heavily on external finance when internal cash flows weaken.

A clearer picture emerges once total debt is decomposed into bank and bond components. Regressions on debt growth rates show that the increase in total debt during recessions is driven almost entirely by bank borrowing. Bank debt growth rises sharply and significantly in recessions, while bond debt growth does not increase in statistically significant way. These findings indicate that banks become the primary source of additional credit during periods of economic stress, whereas public debt markets do not expand to support firms in the same way.

The composition regressions reinforce this conclusion. During recessions, the share of bank debt in total debt increases significantly, while the share of bond debt declines substantially. Moreover, the contraction in bond debt share begins well before recessions officially start, whereas the rise in bank debt share occurs mainly once downturns are underway.

The heterogeneity analysis based on the Kaplan–Zingales index further refines these results. Financially constrained firms exhibit the strongest increase in bank borrowing and the most pronounced decline in bond financing, both in terms of growth rates and debt shares. Less constrained firms retain better access to bond markets but nonetheless shift toward bank debt during recessions. Interaction-term regressions confirm that the substitution toward bank financing is present across all constraint groups, although the relative magnitude varies. Together, these results indicate that financial constraints shape the intensity of debt reallocation but do not overturn the general pattern of increased reliance on banks during downturns.

Taken as a whole, the empirical evidence paints a consistent picture across all specifications. Business cycles affect not only how much firms borrow, but also which financing channels they use. Recessions are characterized by a clear reallocation away from public debt markets and toward bank financing, driven by sharp increases in bank debt growth and corresponding rises in the share of bank debt in total borrowing.

As this empirical framework does not identify the underlying drivers of this reallocation. In particular, it remains unclear whether the increased reliance on bank debt reflects supply-side

factors, such as greater flexibility or continued lending by banks, or demand-side factors, including higher costs or reduced access to public debt markets. Future research could address this by incorporating loan- and bond-level data on pricing, maturities, and lending standards to disentangle these mechanisms. Additionally, future research could examine whether these patterns differ systematically across firms of different size or across industries with varying dependence on external finance and exposure to business cycle fluctuations. Such heterogeneity may shed further light on the extent to which the observed reallocation reflects structural differences in financing needs, market access, or lender relationships. Exploring these dimensions would provide a more granular understanding of how firms adjust their debt composition in response to macroeconomic stress.

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AI Disclosure Statement

In preparing this thesis, the following AI-based tools were used in a limited, supportive role:

- ChatGPT (OpenAI): Used for rephrasing, language editing, and improving readability of text drafted by the author.
- Elicit: Used to support literature discovery, including generating search keywords and identifying potentially relevant academic studies.

All AI-generated suggestions were critically reviewed, verified against original sources, and revised by the author. The analysis, interpretation, and final content of this thesis remain entirely the author's responsibility.

Appendix - Additional Regression Results

This appendix reports regression results corresponding to the baseline specifications presented in the main text, augmented with interaction terms. The inclusion of these terms allows for a more detailed examination of how the effects documented in the main analysis vary across different firm characteristics. For clarity and conciseness, these tables are relegated to the appendix, while the key insights derived from them are discussed in the main body of the paper.

Table 5.²⁰ - Bond and Bank Debt Growth Rate regressions with the interaction term

VARIABLES	Pooled OLS		FE	
	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$
recession	0.1750** (0.0867)	-0.0057 (0.0353)	0.2180** (0.0935)	0.0014 (0.0383)
pre_recession1	-0.0996* (0.0551)	-0.0040 (0.0255)	-0.1020* (0.0554)	-0.0069 (0.0255)
pre_recession2	-0.0794 (0.0628)	0.0342 (0.0280)	-0.0732 (0.0633)	0.0317 (0.0282)
pre_recession3	0.0572 (0.0659)	-0.0609** (0.0284)	0.0629 (0.0661)	-0.0625** (0.0285)
pre_recession4	0.0149 (0.0683)	0.0490** (0.0220)	0.0160 (0.0697)	0.0454** (0.0222)
kzq_2	-0.0095 (0.0215)	0.0154** (0.0076)	-0.0052 (0.0303)	0.0277** (0.0111)
kzq_3	0.0121 (0.0239)	0.0025 (0.0087)	0.0254 (0.0412)	0.0208 (0.0185)
kzq_4	0.0245 (0.0251)	0.0182* (0.0092)	0.0695 (0.0501)	0.0489** (0.0234)
rec_kzq_2	0.0884 (0.1120)	0.0620 (0.0583)	0.0575 (0.1200)	0.0569 (0.0614)
rec_kzq_3	0.0711 (0.1170)	-0.0109 (0.0649)	0.0461 (0.1220)	-0.0175 (0.0675)
rec_kzq_4	0.326** (0.1550)	-0.0128 (0.0447)	0.2950* (0.1640)	-0.0342 (0.0480)
log_total_assets	0.0001 (0.0051)	0.0009 (0.0025)	-0.0173 (0.0208)	0.0029 (0.0094)
revenue_to_assets	-0.0007** (0.0003)	-0.00015 (0.0001)	-0.0069*** (0.0022)	-0.0002 (0.0008)

Table 5. continues on the next page.

²⁰ Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at the firm level are reported in parentheses.

VARIABLES	Pooled OLS		FE	
	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$	$\Delta \ln(\text{Bank Debt})$	$\Delta \ln(\text{Bond Debt})$
debt_to_equity	-0.0001 (0.0001)	0.0000 (0.0000)	0.0000 (0.0002)	0.0000 (0.0001)
gdp_pct	0.0292*** (0.0042)	-0.0006 (0.0014)	0.0301*** (0.0043)	-0.0002 (0.0014)
d_cpi	-0.0165 (0.0130)	-0.0128* (0.0066)	-0.0185 (0.0136)	-0.0144** (0.0070)
d_t_bill	0.0007 (0.0312)	-0.0012 (0.0168)	0.0035 (0.0316)	-0.0013 (0.0169)
Constant	-0.0618 (0.0846)	0.0173 (0.0420)	0.322 (0.3650)	-0.0333 (0.1670)
Observations	8,586	14,755	8,586	14,755
R-squared	0.011	0.002	0.013	0.002

Table 6.²¹ – Bank Debt and Bond Debt Share regressions with the interaction term

VARIABLES	Pooled OLS		FE	
	Bank Debt %	Bond Debt %	Bank Debt %	Bond Debt %
recession	0.537 (1.929)	-9.684*** (3.512)	2.366 (1.588)	-11.26*** (3.142)
pre_recession1	-0.12 (0.742)	-4.994*** (1.264)	-0.973 (0.608)	-4.285*** (1.110)
pre_recession2	-0.921 (0.702)	-4.580*** (1.282)	-0.981* (0.567)	-4.563*** (1.116)
pre_recession3	-0.554 (0.727)	-4.249*** (1.215)	-0.0127 (0.603)	-4.024*** (1.110)
pre_recession4	-0.180 (0.765)	-2.772** (1.158)	-0.518 (0.632)	-2.057** (1.037)
kzq_2	1.972* (1.159)	0.506 (1.782)	1.305 (0.871)	-1.849 (1.630)
kzq_3	4.309** (1.707)	-0.836 (2.282)	3.295*** (1.239)	-4.093* (2.163)

Table 6. continues on the next page

²¹ Notes: ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Standard errors clustered at the firm level are reported in parentheses.

VARIABLES	Pooled OLS		FE	
	Bank Debt %	Bond Debt %	Bank Debt %	Bond Debt %
kzq_4	11.99*** (2.433)	-8.853*** (3.114)	6.874*** (1.729)	-9.324*** (2.918)
rec_kzq_2	4.694 (2.542)	-0.977 (4.026)	1.934 (1.969)	2.361 (3.311)
rec_kzq_3	1.875 (2.287)	0.156 (4.618)	-0.474 (1.958)	4.414 (3.962)
rec_kzq_4	3.353 (2.627)	4.855 (4.063)	2.359 (2.090)	6.288 (3.620)
log_total_assets	-4.778*** (0.646)	1.954** (0.858)	-3.891*** (1.142)	6.120*** (1.519)
revenue_to_assets	0.013 (0.034)	-0.111** (0.051)	-0.063 (0.051)	0.230** (0.114)
debt_to_equity	-0.026*** (0.009)	-0.004 (0.012)	-0.006 (0.006)	0.005 (0.015)
gdp_pct	0.00006 (0.0555)	-0.0883 (0.1060)	0.0923** (0.0460)	-0.0972 (0.0950)
d_cpi	-1.212*** (0.306)	0.508 (0.544)	-1.541*** (0.263)	0.163 (0.454)
d_t_bill	0.56 (0.350)	-0.714 (0.663)	0.599** (0.303)	-0.467 (0.609)
Constant	88.09*** (11.49)	48.18*** (14.92)	74.48*** (19.40)	-28.01 (26.58)
Observations	11,817	11,817	11,817	11,817
R-squared	0.171	0.047	0.06	0.041