Seniority Structure in the Macroeconomy *

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Abstract

Seniority in debt contracts refers to the order of repayment in the event of a firm's default, where senior debt holders are paid before junior creditors. The seniority hierarchy in debt contracts is increasingly relevant in firm financing, yet its aggregate effects are largely understudied. This paper investigates the macroeconomic implications of introducing a seniority structure in firm debt within a dynamic business cycle model with defaultable long-term debt. I show that seniority structure is essential in mitigating the debt dilution problem, which arises when firms issue new debt that diminishes the value of existing claims, particularly in long-term debt markets. By prioritizing senior claims in case of default, firms can protect senior debt holders from dilution, leading to a more efficient credit allocation. My model demonstrates that seniority structure reduces risk premia on senior bonds, lowers firm leverage, and induces more stable investment patterns. Additionally, I provide empirical evidence using firm-level data that seniority structure is associated with lower default rates and reduced financial fragility, particularly during economic downturns. On the aggregate level, introducing seniority in firm debt smooths business cycle fluctuations, reduces macroeconomic volatility, and enhances financial stability.

Keywords: Debt Dilution, Seniority Structure, Firm Default
JEL Codes: E22, E44, G31, G32, O16, E44

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1 Introduction

The financial health of firms is a pivotal determinant of macroeconomic stability and growth. Firms' access to external finance, particularly through debt markets, influences their capacity to invest, innovate, and contribute to aggregate economic activity (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997). However, debt issuance introduces potential frictions that can destabilize individual firms and the broader economy. Critical friction in this context is the debt dilution problem, which occurs when firms issue new debt that diminishes the value of existing creditors' claims, especially in the presence of long-term debt (Bolton and Scharfstein, 1996; Bizer and DeMarzo, 1992). This dilution can lead to adverse credit market conditions, reduce firms' investment efficiency, and exacerbate financial instability.

One promising solution to the debt dilution problem is the introduction of a seniority structure in debt contracts, where different classes of debt have distinct priorities in the event of default (Hart and Moore (1995); Diamond (1993)). Senior debt holders are repaid first, followed by junior debt holders. This repayment hierarchy gives senior debt holders greater protection against losses, making senior debt less risky and, consequently, less costly for firms to issue. Conversely, junior debt bears more risk but offers firms greater flexibility in managing debt obligations. Despite the importance of seniority structures in corporate finance, their aggregate implications—particularly regarding long-term debt and macroeconomic volatility—remain underexplored (Leland, 1998; Colla et al., 2013).

This paper fills this gap by introducing endogenous seniority structures into a dynamic macroeconomic model with defaultable long-term debt. We analyze how seniority mitigates the debt dilution problem and explore its broader macroeconomic implications. Our findings demonstrate that seniority structures influence firm-level outcomes—such as leverage, investment decisions, and default probabilities—and have significant consequences for aggregate fluctuations and financial stability.

This paper makes several significant contributions to the literature on corporate finance and macroeconomic dynamics. First, it introduces an endogenous seniority structure into a dynamic model with defaultable long-term debt. It provides a novel framework to analyze how debt seniority can mitigate the debt dilution problem. Second, the paper demonstrates the substantial macroeconomic implications of debt seniority structures, showing that they reduce firms' default risk, lower borrowing costs, and stabilize investment patterns, thereby enhancing financial stability and smoothing business cycle fluctuations. Third, by combining theoretical modeling with empirical analysis using firm-level data, the study validates the model's predictions and offers robust evidence that firms with pronounced seniority hierarchies exhibit lower default rates and reduced financial fragility, particularly during economic downturns. Lastly, the paper discusses the policy implications of these findings, suggesting that regulatory frameworks promoting optimal debt arrangements can enhance financial stability without compromising firms' investment efficiency.

By incorporating seniority structures into a standard business cycle model, we study how firms adjust their debt issuance and capital accumulation strategies when they can issue both senior and junior debt. In long-term debt, firms face the temptation to dilute existing creditors by issuing new junior debt, particularly during periods of financial stress (Myers, 1977; Admati et al., 2018). This dilution exacerbates credit market frictions, raising borrowing costs and distorting firms' investment decisions. However, by issuing senior debt with priority in repayment, firms can mitigate the dilution problem, leading to lower risk premia on senior debt and a more stable credit environment.

From a macroeconomic perspective, introducing a seniority structure has important implications for the business cycle. Seniority reduces firms' overall default risk, resulting in lower spreads on corporate bonds and smoother investment dynamics (Arellano and Ramanarayanan, 2012; Hatchondo and Martinez, 2009). This, in turn, helps stabilize aggregate output and reduce the amplitude of economic fluctuations. Moreover, the seniority hierarchy acts as a buffer during economic downturns, as firms are more likely to default on junior debt rather than senior debt, potentially preventing systemic financial crises and mitigating spillover effects to the broader economy(Gertler and Kiyotaki, 2010; Brunnermeier and Sannikov, 2014).

Our analysis is grounded in both theoretical modeling and empirical evidence. We calibrate our model using firm-level data on debt structures and default rates to examine the quantitative impact of seniority structures on macroeconomic aggregates such as output, investment, and consumption. We also explore the interaction between seniority structures and other financial frictions, such as liquidity constraints and firm heterogeneity (Hopenhayn, 1992; Khan and Thomas, 2013). Empirically, we utilize data from Compustat and other firm-level databases to validate the model's predictions and estimate the impact of seniority structures on firm behavior and macroeconomic outcomes. We find that firms with a higher proportion of senior debt exhibit lower default rates and more stable investment patterns, particularly during periods of financial stress.

The results of this paper have important policy implications. Regulators and policymakers often face balancing financial stability with market flexibility. While seniority structures can reduce the risk of widespread defaults and enhance financial stability, they may also affect firms' ability to adjust their debt in response to changing economic conditions (Borio and Zhu, 2012; Adrian and Shin, 2010). Therefore, policymakers must consider the trade-offs involved in promoting seniority structures in corporate debt markets. Our findings suggest that macroprudential policies encouraging optimal seniority structures could enhance financial stability and reduce the likelihood of financial crises without imposing significant costs on firms' investment efficiency.

Related Literature.

This paper builds upon and contributes to several strands of corporate finance and macroeconomics literature, particularly concerning debt structures, financial frictions, and their macroeconomic implications.

The debt dilution problem has been a longstanding concern in corporate finance. Myers (1977) first highlighted how issuing additional debt can harm existing creditors, leading to inefficiencies in investment decisions. Bolton and Scharfstein (1996) further explored how multiple creditors can exacerbate financial distress due to coordination failures. Bizer and DeMarzo (1992) examined sequential banking and how new debt issuance affects the value of existing claims. My paper extends this line of research by introducing an endogenous seniority structure as a mechanism to mitigate debt dilution in a dynamic macroeconomic setting. While previous studies have acknowledged the potential of seniority to alleviate dilution (e.g., Hart and Moore, 1995), they often do so in static models or without considering the macroeconomic context. By embedding seniority choices within a business cycle framework, I provide a dynamic analysis of how firms strategically determine their debt structures over time.

In sovereign debt literature, Chatterjee and Eyigungor (2015) introduced a seniority arrangement to address the debt dilution problem. They developed a model where sovereigns can issue long-term debt with endogenous seniority structures to mitigate dilution and improve borrowing terms. Their work demonstrates that assigning seniority to debt instruments can reduce default risk and enhance welfare. Our paper extends this line of research to the corporate sector, analyzing how endogenous seniority structures in firms' debt can mitigate dilution and influence macroeconomic outcomes.

The role of debt seniority in corporate finance has been studied in various contexts. Diamond (1993) analyzed debt maturity and seniority, showing how they affect firms' borrowing costs and risk of default. Hart and Moore (1995) discussed how seniority and hard claims constrain managerial behavior, influencing firms' investment and financing decisions. Empirical studies, such as Benmelech and Bergman (2009), have investigated the determinants of debt seniority and its effects on firm outcomes. My paper contributes to this literature by providing theoretical and empirical evidence on how endogenous seniority structures impact firm-level outcomes and aggregate economic dynamics. I show that similar to the sovereign context studied by Chatterjee and Eyigungor (2015), seniority arrangements in corporate debt can mitigate the debt dilution problem and have significant macroeconomic implications.

Including long-term debt in macroeconomic models has been important for understanding financial frictions and their economic effects. Arellano and Ramanarayanan (2012) studied sovereign debt with long maturity and its implications for default risk and interest rates. Hatchondo and Martinez (2009) analyzed how the maturity structure of sovereign debt affects default incentives. In the corporate context, Leland and Toft (1996) modeled optimal capital structure with endogenous bankruptcy and debt maturity choices. Jungherr and Schott (2022) introduced the concept of "slow-moving debt" to highlight how the sluggish adjustment of debt due to its long-term nature can amplify economic downturns. They show that the slow adjustment of corporate debt levels can lead to deeper and more prolonged recessions because firms cannot quickly deleverage in response to negative shocks. My paper adds to this area by examining how the maturity and seniority of corporate debt interact to influence firms' default decisions and investment behavior, thereby affecting macroeconomic stability. By introducing endogenous seniority structures, we provide a mechanism through which firms can more effectively manage their debt obligations, potentially mitigating the adverse effects of slow-moving debt.

The interaction between financial frictions and business cycles has been extensively studied. Bernanke and Gertler (1989) introduced the concept of the financial accelerator, showing how credit market imperfections can amplify economic fluctuations. Kiyotaki and Moore (1997) developed a model where collateral constraints lead to persistent effects of temporary shocks. More recently, models incorporating heterogeneous firms and financial frictions have been used to analyze investment dynamics and default risk. Gertler and Kiyotaki (2010); Brunnermeier and Sannikov (2014) developed frameworks to study how financial intermediaries and leverage constraints impact macroeconomic outcomes. Our paper adds to these models by incorporating endogenous debt seniority structures, highlighting a new channel through which financial frictions can be mitigated.

Empirical research has provided insights into how debt structures affect firm performance and risk. Colla et al. (2013) examined debt specialization and found that firms often concentrate their borrowing on specific types of debt, influenced by factors such as asset tangibility and profitability. Almeida and Campello (2007) showed that financial constraints and asset tangibility significantly affect corporate investment.

Our empirical analysis complements these studies by demonstrating that firms with pronounced seniority hierarchies tend to have lower default rates and more stable investment patterns, particularly during economic downturns. This evidence supports our theoretical predictions and underscores the importance of debt seniority in influencing firm behavior and financial stability.

The role of regulatory frameworks in shaping corporate debt structures has been a topic of interest. Borio and Zhu (2012) discussed how capital regulation and risk-taking behavior interact, affecting monetary policy transmission. Adrian and Shin (2010) highlighted the importance of liquidity and leverage in financial intermediaries, with implications for systemic risk.

My findings suggest that promoting optimal debt arrangements through regulatory policies can enhance financial stability without hindering firms' investment efficiency. This aligns with the objectives of macroprudential regulation, which aims to mitigate systemic risks and prevent financial crises. My paper provides a theoretical foundation and empirical support to inform policymakers about the potential benefits and trade-offs of encouraging seniority structures in corporate debt markets.

Layout. The rest of the current paper is organized as follows. Section 2 presents the equilibrium model with firm investment, long-term debt, and seniority structure. Section 3 presents the model parametrization, its quantitative results, and the role of debt seniority structure in cross-sectional and aggregate investment dynamics. I conclude in section 4.

2 Model

I develop a dynamic macroeconomic model with long-term risky debt and seniority structures. Time is discrete, $t = 1, 2, \ldots$, and as we set in a period, I use the prime symbol ($'$) to denote the future values. The economy is populated by: a representative household, a measure-one continuum of publicly–traded firms indexed by i, two competitive classes of creditors (senior and junior), and a passive government that levies a corporate income tax. The main ingredients in the model follow: (1) firms use labor and capital as factors of production; (2) to finance their capital investments, they combine equity and debt issuance decisions; (3) debts are sold as long-term defaultable bonds; (4) debt consists of senior bond and junior bond following a composition law of the share of senior; (5) in case of default, firms repay regarding the seniority structure of their debts.[1]

Senior debt typically offers lower risk and cost to the issuer. In contrast, junior debt offers higher yields to investors in exchange for increased risk and gives the issuer more flexibility at a higher price. I aim to capture how seniority mitigates *debt dilution* and propagates to aggregate volatility and risk premia.

[1] I assume in my environment that only public firms can access long-term defaultable debts, see Karabarbounis and Macnamara (2021).

2.1 Setup

We consider a firm operating in a dynamic setting. The state variables are the firm's productivity z, capital k, total debt b, and the share of senior debt s. Every period, the firm makes decisions about its capital stock, the amount of debt issued, and the fraction of senior debt. The firm faces persistent productivity shocks, denoted z, which evolve according to a Markov process.

2.1.1 Technology and Productivity

Firms are perfectly competitive and produce a single, unique, homogeneous final good. Each firm produces by combining capital k and labor l in a decreasing returns-to-scale technology and using a Cobb-Douglas production function:

$$y = z\left(k^{\psi}l^{1-\psi}\right)^{\nu}$$

where $\psi, \nu \in (0,1)$. z is the total factor productivity following a persistent shock learned from the previous period. The idiosyncratic productivity z follows an AR(1) process:

$$logz' = \rho_z logz + \epsilon_z', \quad \epsilon_z' \sim^{i.i.d.} \mathcal{N}\left(0, {\sigma_z}^2\right), \quad \rho_z \in (0,1)$$

The firm pays a fixed cost of operation of f every period; the capital depreciates at a rate δ. The firm is subject to a capital quality shock, realised after production, an idiosyncratic capital quality shock ε i.i.d. across time and firms, drawn from a normal distribution $\mathcal{N}(0, \sigma_\varepsilon^2)$, and which governs endogenous default.

2.1.2 Financing Structure

Firms finance operations through retained earnings and by issuing long-term debt with an endogenous seniority structure. There are two types of debt:

- **Senior Debt**: b_t^s has priority in repayment in the event of default. A long-term debt issued in the period t promising to pay a fixed coupon c each period. The market price of such a senior bond is set at p^s at the issuance period.

- **Junior Debt**: b_t^j is subordinate to senior debt and is repaid after senior claims are satisfied. This is a long-term debt issued in the period t with a promise to pay a fixed coupon c each period until maturity. The market price of such a junior bond is set at p^j at the issuance period.

Debt amortized at a constant rate $\gamma \in (0,1)$ as in Hatchondo and Martinez (2009); Chatterjee and Eyigungor (2012); Gomes et al. (2016). Each period, a fraction γ of outstanding debt matures when the firm does not default and must be repaid, while $(1-\gamma)$ continues to the next period. The firm can issue new debt $\tilde{b}$, then, with a fraction $\tilde{s} \in [0,1]$ of the new debt being senior debt. The law of motion for the total debt b' and the share of senior debt s' is given by:

$$b' = (1-\gamma)b + \tilde{b}, \qquad s' = \begin{cases} s(1-\gamma)\dfrac{b}{b'} + \tilde{s}\dfrac{b' - (1-\gamma)b}{b'}, & \text{if } b' > (1-\gamma)b, \\ s, & \text{otherwise.} \end{cases} \tag{1}$$

This formulation ensures that the share of senior debt evolves as a weighted average of the remaining senior debt after repayments and the senior share of newly issued debt.

Issuance costs. I assume that retiring all the outstanding debt $\left(\tilde{b} \geq 0\right)$ is costless for the firm. The specification takes a quadratic form as is done in the literature (see Jungherr and Schott (2021)). The cost of issuing new debt is:

$$\eta_b = \left(\eta_s \tilde{s}^2 + \eta_j (1-\tilde{s})^2\right) \cdot \left[\max(0, \tilde{b})\right]^2$$

The firm can also issue equity but with a lower bound $e \geq -\underline{e}$ where $\underline{e} > 0$, avoiding the possibility of financing constantly through equity Ponzi games. I assume that the firm incurs a cost when it issues external equity ($e \geq 0$), and no cost when it distributes dividends ($e < 0$). The cost of issuing new external equity is expressed in quadratic form:

$$\eta_e = \eta_e \cdot [\max(0, e)]^2$$

2.1.3 Capital Dynamics

Each period, the firm produces output y with the capital k, then invests. Capital in the next period k' is the firm's investment decision, determined by the level of equity e, net cash flows n, and the revenue from new debt issuance:

$$k' = e + n + p\tilde{b} - \eta_b(\tilde{b}), \tag{2}$$

Where p is the price of debt and the cash-flow identity is:

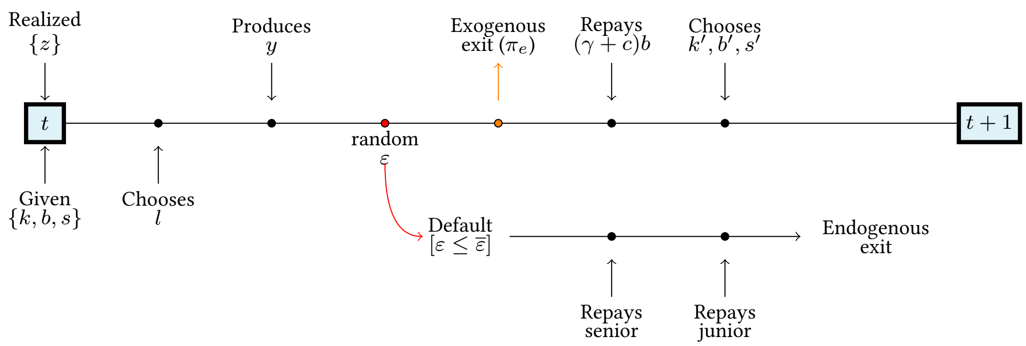
$$n = k - \gamma b + (1-\tau)(y + \varepsilon k - \delta k - cb - wl - f). \tag{3}$$

Here, w is the competitive wage set in the household problem below. Endogenous default occurs when the realisation of ε pushes the continuation value below zero, as defined in (5).

2.2 Firm's Problem

Each period, the firm has its new productivity z, it gets the information on the latest interest rate r, and based on its vector of state variables $x = \{k, b, s\}$ decided in the previous period, it chooses its labor to produce. The firm maximizes the expected present value of dividends to equity holders. Let $V(z, k, b, s)$ be the value of the solvent firm making the finance-investment decision.

Figure 1: TIMING FOR THE FIRM'S PROBLEM



Notes: The first blue indicates the beginning of period t and the last marks the beginning of the next period $t + 1$. The firm decides to continue operations or to default endogenously (red arrow), after the capital quality shock ε. The exogenous exit is illustrated in orange and happens with a probability π_e.

The timing within a period t is illustrated in Figure 1 and is as follows. A firm carries capital k, debt b, and the share of senior debts s. Given its realized productivity z, it chooses the labor l to produce y. Knowing the distribution of the capital quality shock, the firm decides on the cutoff $\bar{\varepsilon}$. The firm decides k', b', s' upon non-default. Then, at the beginning of the period, the value of the firm is given by:

$$V(z, k, b, s) = \max \left\{ \underbrace{V^r(z, k, b, s)}_{\text{continue}}, \underbrace{0}_{\text{default}} \right\}. \tag{4}$$

I assume that by default, the firm exists and receives 0, which implies the following definition of the default cutoff $\bar{\varepsilon}$:

$$\bar{\varepsilon} : 0 = V^r(z, k, b, s) \tag{5}$$

Upon non-default, the value received by the firm is $V^r(z, k, b, s)$, defined by:

$$V^r(z, k, b, s) = (1 - \pi_e)V^c(z, k, b, s) + \pi_e V^x(z, k, b, s). \tag{6}$$

V^r represents the repayment value of the firm when it decides to continue. In this case, a probability π_e still exists to exit exogenously, then with its earnings after production, the firm has to liquidate its capital and debt. It pays back its outstanding debt and pays out the dividend to shareholders. Its value in exogenous exit is:

$$V^x(z,k,b,s) = n - (1-\gamma)bp, \tag{7}$$

where I denote by n the firm's asset in place before any shock.

V^c is the firm's value when it survives endogenous default and exogenous exit. The firm's objective is to maximize the present value of its cash flows, including the net income from production and the firm's value after making debt and capital decisions. The firm chooses how much capital k', debt b', and the seniority structure s' to carry into the next period. The firm defaults if the value of continuing operations is lower than the default threshold, denoted by the critical shock $\overline{\varepsilon}'$. The continuation value of the firm satisfies:

$$V^c(z,k,b,s) = \max_{e,k',b',s'} \left\{ -e - \eta_e(e) + \frac{1}{1+r}\mathbb{E}_{s'|s} \int_{\overline{\varepsilon}'}^{\infty} V^r(z',k',b',s') d\Phi(\varepsilon') \right\} \tag{8}$$

subject to:

$$\begin{aligned}
k' &= e + n + p\tilde{b} - \eta_b(\tilde{b}) \\
n &= k - \gamma b + (1-\tau)(y + \varepsilon k - \delta k - cb - f), \\
\overline{\varepsilon}' : 0 &= V^r(z',k',b',s'), \\
p &= \tilde{s}p^s + (1-\tilde{s})p^j.
\end{aligned}$$

Where p is the weighted average price of the new debt, composed by the price of the senior (junior) new bond $p^s(p^j)$.

2.3 Creditors and Bond Pricing

There are two competitive, risk-neutral creditor classes. Each class prices its bond so that expected discounted returns equal the risk-free rate. Let p^s and p^j be the *ex-coupon* prices quoted in equations (10)–(11). These formulas now integrate over both productivity z' and capital-quality shock ε', taking firms' default and issuance policies as given.

2.3.1 Recovery in Default

Given the next period share of senior debt s', in the event of default in the next period, a fraction $s'\xi_s + (1-s')\xi_j$ of the firm's assets is lost. The total recovery value of the firm's assets after default is:

$$\underline{n}' = [s'(1-\xi_s) + (1-s')(1-\xi_j)] \max\Big\{0, k' + (1-\tau)\Big[y' + \varepsilon k' - \delta k' - f\Big]\Big\} \tag{9}$$

Where ξ_i is the loss given default for debt of type i. Since senior debt has a higher recovery rate, we have $\xi_s < \xi_j$. The recovery rule dictates how the firm's remaining assets are distributed between senior and junior bondholders:

- Senior bondholder receives up to the amount of the senior debt $s'b'$: $\min\left\{1+r, \frac{\underline{n}'}{s'b'}\right\}$.
- Junior bondholder receives any remaining proceeding: $\max\left\{0, \frac{\underline{n}' - s'b'(1+r)}{1-s'b'}\right\}$.

2.3.2 Senior Bond Pricing p^s

The price of senior debt depends on the probability of default and the expected recovery in the event of default. It can be expressed as:

$$\begin{aligned} p^s(z,k',b',s') = \frac{1}{1+r}\mathbb{E}_{z'|z}\Bigg\{ &\int_{\bar{\varepsilon}'}^{\infty} \left[\gamma + c + (1-\gamma)\overline{p}^s(z',\hat{x}^k,\hat{x}^b,\hat{x}^s)\right] d\Phi(\varepsilon') \\ &+ \int_{-\infty}^{\bar{\varepsilon}'} \min\left\{1+r, \frac{\underline{n}'}{s'b'}\right\} d\Phi(\varepsilon')\Bigg\} \quad , \end{aligned} \tag{10}$$

where r is the risk-free rate, and the continuation price $\overline{p}^s(z',\hat{x}^k,\hat{x}^b,\hat{x}^s)$ accounts for the possibility that the bond will not default and will continue to pay out over future periods. $\hat{x}$ represents the policy function for choice variables k, b, s. The "min" operator is important in modeling the lender's potential recovery in the event of default. It ensures that the lender's recovery is the smaller of two values: either the full repayment of the debt (principal plus interest) or the value of the firm's assets in the default case.

2.3.3 Junior Bond Pricing p^j

Similarly, the price of junior debt accounts for its subordination in default and lower recovery rates:

$$\begin{aligned} p^j(z,k',b',s') = \frac{1}{1+r}\mathbb{E}_{z'|z}\Bigg\{ &\int_{\bar{\varepsilon}'}^{\infty} \left[\gamma + c + (1-\gamma)\overline{p}^j(z',\hat{x}^k,\hat{x}^b,\hat{x}^s)\right] d\Phi(\varepsilon') \\ &+ \int_{-\infty}^{\bar{\varepsilon}'} \max\left\{0, \frac{\underline{n}' - s'b'(1+r)}{(1-s')b'}\right\} d\Phi(\varepsilon')\Bigg\} \quad , \end{aligned} \tag{11}$$

The key difference from senior debt pricing is the lower expected recovery in case of default due to its junior status.

2.4 Households

A representative household supplies labour inelastically (one unit normalised) and chooses consumption C_t and real risk-free bond holdings A_{t+1}. Preferences are time-separable:

$$\mathbb{E}_0 \sum_{t\geq 0} \beta^t\, u(C_t), \quad u(C) = \frac{C^{1-\sigma}}{1-\sigma},\ \beta \in (0,1). \tag{12}$$

The period budget constraint is

$$C_t + \frac{A_{t+1}}{1+r_t} = w_t + A_t + T_t, \tag{13}$$

where T_t are lump-sum transfers of corporate-tax revenue. The Euler equation pins down the risk-free rate:

$$1 = \beta\, \mathbb{E}_t \left[\frac{u'(C_{t+1})}{u'(C_t)} (1 + r_{t+1}) \right]. \tag{14}$$

We abstract from direct household holdings of corporate bonds, which are competitive specialised creditors intermediate between firms and households.

2.5 Government

The government levies a flat corporate tax at a rate τ and rebates revenue to households:

$$T_t = \tau \int (y_i - w\ell_i)\mathrm{d}i. \tag{15}$$

We assume a balanced budget each period.

2.6 Competitive Equilibrium

A *recursive competitive equilibrium* is a set of value functions $\{V, V^r, V^c, V^x\}$, policy functions $\{\ell', k', b', s', e', \tilde{b}, \tilde{s}\}$, bond-pricing functions $\{p^s, p^j\}$, factor prices $\{w, r\}$, and a measure μ over firm states such that:

1. Given prices, firm policies solve (4).
2. Bond prices satisfy the zero-profit conditions (10)–(11).
3. The household solves (14) subject to (13).

4. Factor markets clear: $\int \ell_i \, \mathrm{d}\mu = 1$ and $\int k_i \, \mathrm{d}\mu = K$.
5. Goods market clears: aggregate output equals aggregate consumption plus investment and adjustment costs.
6. The law of motion for μ is induced by firms' optimal policies and exogenous shocks.

3 Quantitative Analysis

Coming soon...

4 Conclusion

This paper provides new insights into the macroeconomic implications of seniority structures in firm debt, an important yet underexplored feature of corporate finance. By incorporating endogenous seniority hierarchies into a dynamic macroeconomic model with defaultable long-term debt, I demonstrate how seniority structures mitigate the debt dilution problem, enhance financial stability, and influence firms' capital accumulation and investment decisions.

My model shows that senior debt, with its priority in repayment, allows firms to issue debt at a lower cost, reducing the risk premia associated with financing. This reduction in financing costs enables firms to stabilize their investment patterns, particularly during periods of economic stress, thereby smoothing business cycle fluctuations and reducing macroeconomic volatility. In contrast, junior debt offers firms greater flexibility in managing debt obligations but at the cost of higher interest rates and increased default risk. This trade-off between senior and junior debt allows firms to optimize their debt portfolios in a way that balances cost, risk, and flexibility.

Empirically, I validate my theoretical predictions by analyzing firm-level data. I show that firms with more pronounced seniority hierarchies exhibit lower default rates and more stable investment patterns, particularly during downturns. These results suggest that seniority structures can act as a buffer in times of economic stress, reducing the likelihood of widespread defaults and contributing to financial stability.

From a macroeconomic perspective, the introduction of debt seniority has important implications for both firm-level outcomes and aggregate economic dynamics. Seniority structures lower firms' overall leverage and default probabilities, leading to smoother investment dynamics and lower spreads on corporate bonds. As a result, the economy experiences less volatility and more stable growth. These findings underline the potential benefits of incorporating debt seniority in firm financing decisions, both in terms of enhancing firm performance and promoting macroeconomic stability.

Finally, my analysis has significant policy implications. Policymakers and regulators seeking to enhance financial stability without compromising firms' investment efficiency may consider promoting optimal seniority structures in corporate debt markets. By reducing the risk of debt dilution and lowering default rates, seniority structures can help mitigate systemic financial risks and improve credit market efficiency. However, it is also essential to acknowledge potential trade-offs, as overly rigid seniority structures may limit firms' flexibility to adjust their debt obligations in response to changing economic conditions.

In conclusion, this paper contributes to the literature by providing a comprehensive analysis of the role of debt seniority in mitigating financial frictions and stabilizing the macroeconomy. My findings encourage further research into how different debt structures shape aggregate economic outcomes, especially in the context of long-term financing and firm heterogeneity. As firms and policymakers navigate increasingly complex financial environments, understanding the dynamics of seniority structures will be crucial for maintaining financial stability and supporting sustainable economic growth.

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Appendix to "Seniority Structure in the Macroeconomy"

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A Data

Coming soon...

B Household Side

B.1 Utility maximisation

The representative household solves

$$\max_{\{C_t, A_{t+1}\}} \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\sigma} - 1}{1-\sigma} \quad \text{s.t. } C_t + \frac{A_{t+1}}{1+r_t} = w_t + A_t + T_t. \tag{A1}$$

FOC $u'(C_t) = \lambda_t$ together with its intertemporal counterpart delivers the Euler equation

$$1 = \beta \, \mathbb{E}_t \left[\frac{C_{t+1}^{-\sigma}}{C_t^{-\sigma}} (1 + r_{t+1}) \right], \tag{A2}$$

which pins down the risk-free rate given aggregate consumption dynamics.

C Firm Problem – Detailed Derivations

C.1 Static factor demand

Setting marginal product equal to factor prices yields

$$w_t = (1-\psi)\nu z_t (k_t^{\psi} \ell_t^{1-\psi})^{\nu-1} \ell_t^{-\psi}; \quad \Rightarrow \ell_t = \left[\frac{(1-\psi)\nu z_t k_t^{\psi\nu}}{w_t} \right]^{\frac{1}{1-\psi\nu}}. \tag{A3}$$

C.2 Default threshold

Default occurs when $V^r(z_t, k_t, b_t, s_t) = 0$. Because V^r is decreasing in the capital-quality shock ε_t, a unique cutoff $\bar{\varepsilon}$ solves this condition. Monotonicity follows from envelope arguments similar to ?.

C.3 FOCs with respect to continuation controls

Let λ_t be the multiplier on the financing constraint $k_{t+1} = \dots$. Taking derivatives inside the expectation (valid by dominated convergence):

$$\textbf{(i) Equity } -1 - 2\eta_e \max\{0, e_t\} + \lambda_t = 0, \tag{A4}$$

$$\textbf{(ii) Debt } \lambda_t p_t = (1-\gamma)\mathbb{E}_t \frac{\partial V^c_{b'}}{1+r_t}, \tag{A5}$$

$$\textbf{(iii) Seniority share } \lambda_t \tilde{b}_t \partial_{\tilde{s}} p_t + \lambda_t 2(\eta_s - \eta_j)(\tilde{s} - 1/2)\max\{0, \tilde{b}_t\} = \mathbb{E}_t \frac{\partial V^c_{s'}}{1+r_t}. \tag{A6}$$

C.4 Envelope conditions

$$V_k = \lambda_t[1 - \delta + \partial_k n_t + (1-\pi_e)\partial_k V^c_t], \quad V_b = \lambda_t[-\gamma + c]. \tag{A7}$$

D Bond Pricing

D.1 Risk-neutral valuation

Using the risk-neutral measure $\mathbb{Q}$:

$$p^s(x_{t+1}) = \frac{1}{1+r}\,\mathbb{E}^{\mathbb{Q}}\Big[(\gamma + c + (1-\gamma)p^s_{t+1})\mathbf{1}_{\varepsilon > \bar{\varepsilon}'} + \min\{1+r, \underline{n}'/s'b'\}\mathbf{1}_{\varepsilon \le \bar{\varepsilon}'}\Big],$$

$$p^j(x_{t+1}) = \frac{1}{1+r}\,\mathbb{E}^{\mathbb{Q}}\Big[(\gamma + c + (1-\gamma)p^j_{t+1})\mathbf{1}_{\varepsilon > \bar{\varepsilon}'} + \max\{0, (\underline{n}' - (1+r)s'b')/[(1-s')b']\}\mathbf{1}_{\varepsilon \le \bar{\varepsilon}'}\Big]. \tag{A8}$$

$$\tag{A9}$$

D.2 Comparative statics w.r.t. s'

Differentiating p^s:

$$\partial_{s'} p^s = \frac{1}{1+r}\,\mathbb{E}^{\mathbb{Q}}\Big[(1 - \xi_s - 1 + \xi_j)A' \cdot \frac{\mathbf{1}_{\varepsilon \le \bar{\varepsilon}'}}{s'^2 b'}\Big] > 0, \tag{A10}$$

because $\xi_s < \xi_j$. An analogous calculation gives $\partial_{s'} p^j < 0$; see **??** for similar priority arguments.

E Leverage and Investment

Combining FOC (ii) with (iii) yields

$$(1-\tau)c_t - \partial_{b'} p^s s' - \partial_{b'} p^j (1-s') + \lambda_b = 0 \;\Rightarrow\; \frac{\partial b'}{\partial s'} < 0. \tag{A11}$$

Substituting into the capital accumulation equation raises the marginal product of capital:

$$\text{MPK} = r + \delta + \gamma[(1-s')\text{Spread}_j + s'\text{Spread}_s],\;\; \partial_{s'}\text{MPK} > 0. \tag{A12}$$

F Aggregation and Log-linearisation

Denote steady-state variables with bars and log-deviations $\hat{x}_t = \log(x_t/\bar{x})$. Log-linearising the firm FOCs and the market-clearing conditions yields the state-space system

$$B\,\mathbb{E}_t \hat{x}_{t+1} = A\,\hat{x}_t + E u_t, \tag{A13}$$

where u_t collects shocks $(\varepsilon_t, \varepsilon_t^z)$ and matrices (A, B, E) are provided in the supplemental MATLAB file. Solving (A13) under Blanchard–Kahn conditions delivers impulse-response functions analysed in Section 5.

G Parameter Targets and Empirical Moments

Table A1: Calibration targets for recovery and spreads

Moment	Data	Model
Senior secured recovery (%)	60	60
Senior unsecured recovery (%)	32	33
Subordinated recovery (%)	18	19
OAS wedge (senior–junior, bp)	85	87

H Proofs of Propositions

H.1 Proposition1 (Seniority compresses senior spreads)

Proof. Combine (A10) with the definition of yield $y^s = c + p^s$; monotonicity of the price implies the inverse for the yield. ■

H.2 Proposition2 (Higher s lowers leverage)

Proof. Differentiate the leverage FOC (A11) with respect to s'; the sign of $\partial_{s'} b'$ inherits that of the second-order condition $\partial^2_{b'} p^{\cdot} < 0$. ■

H.3 Proposition3 (Macro volatility dampening)

Log-linearise investment $\hat{i}_t$ around steady state and substitute $\partial_{s'} b' < 0$; the variance of $\hat{i}_t$ is a decreasing function of the unconditional mean of s_t. ■