Credit Cycles and Creditor Rights*

Martin Kornejew† Shohini Kundu‡ Karsten Müller §

February 1, 2026

Abstract

Do creditor rights amplify or mitigate the macroeconomic consequences of credit cycles? Using a panel of 39 countries from 1978 to 2019, we show that credit expansions in economies with strong creditor protection are followed by smaller output losses, fewer non-performing loans, and a greater reallocation of credit away from risky borrowers. Firm-level evidence from the staggered adoption of antirecharacterization laws across U.S. states shows that well-protected creditors cut credit to risky firms with poor growth prospects, while easing credit constraints for productive firms. Our findings suggest that stronger creditor rights can enhance macroeconomic stability by facilitating a more efficient reallocation of capital.

*We thank Viral Acharya, Sam Antill, Andrew Atkeson, Vladimir Asriyan, Matthew Baron, Olivier Darmouni, Andrea Eisfeldt, Daniel Greenwald, Valentin Haddad, Edie Hotchkiss, Mahyar Kargar, Simone Lenzu, Yueran Ma, Bruno Pellegrino, Noémie Pinardon-Touati, Avanidhar Subrahmanyam, Adi Sunderam, Olivier Wang, Pierre-Olivier Weill and seminar participants at Columbia Business School and the Federal Reserve Board as well as audience members at the Chicago-Harvard-Wharton Insolvency and Restructuring conference, UCLA Finance Brownbag, UCLA Macro-Finance Brownbag, Bocconi University Brownbag, and National University of Singapore Brownbag for their insightful comments. We are grateful to Aurelio Gurrea-Martinez for sharing his creditor rights index. We thank Arnav Mishra for excellent research assistance. All errors are our own. Martin Kornejew gratefully acknowledges financial support from the Open Society Foundations. Müller acknowledges support from the NUS Risk Management Institute (A-8002360-00-00).

†Bocconi University, Department of Finance, IGIER and BAFFI; martin.kornejew@unibocconi.it

‡University of California, Los Angeles, Anderson School of Management and CEPR; shohini.kundu@anderson.ucla.edu

§National University of Singapore, NUS Business School, Department of Finance and Risk Management Institute, and CEPR; kmueller@nus.edu.sg

1 Introduction

Severe recessions often come on the heels of accelerated growth of private debt (e.g., Kindleberger, 1978; Minsky, 1977; Reinhart and Rogoff, 2011; Schularick and Taylor, 2012; Greenwood et al., 2022; Müller and Verner, 2023). Yet the economic consequences of these credit booms vary widely. In some cases, downturns appear to play a *cleansing* role, reallocating capital and labor away from inefficient firms and toward more productive uses. In others, they damage the economy, depressing demand, and leaving behind a legacy of impaired balance sheets and persistently weak growth (e.g., Barlevy, 2002; Caballero et al., 2008; Jordà et al., 2022).

A central determinant of which outcome prevails is how losses are allocated when borrowers default. The resolution of default is governed by legal institutions that define creditor–debtor relationships – contract enforcement, statutory protections, and judicial discretion – which shape incentives and behavior of both borrowers and lenders during credit booms and their unwinding. By influencing who bears losses and when default occurs, creditor rights shape the incentives of borrowers and lenders during downturns. In doing so, they can fundamentally alter whether credit booms culminate in an efficient reallocation of resources or prolonged macroeconomic distress.

This paper examines whether creditor rights mitigate or amplify the macroeconomic risks of credit booms. Prior work shows that stronger creditor rights are associated with deeper credit markets (La Porta et al., 1998; Djankov et al., 2007; Benmelech and Bergman, 2011, among others). Yet, excessive creditor power can lead to inefficient liquidations, raise the cost of default, and discourage entrepreneurial risk-taking (e.g., Acharya and Subramanian, 2009; Acharya et al., 2011; Vig, 2013; Kornejew, 2025). This literature has largely focused on effects in steady state, leaving open how creditor rights shape the economic consequences of credit cycle dynamics.

We outline two competing views that guide our analysis. The *amplification view* predicts that strong creditor rights exacerbate boom-bust cycles by fueling credit expansion during upswings and triggering aggressive liquidations during downturns. This view resonates with work on the resolution of household debt in the United States (Mian et al., 2015; Auclert et al., 2019; Auclert and Mitman, 2023). According to the *dampening view*, strong creditor rights discipline borrowers ex-ante, shield creditor balance sheets and promote an efficient reallocation of resources ex-post.

Our analysis focuses on corporate credit, which accounts for the majority of defaults during

severe downturns (Ivashina et al., 2024). This distinguishes our analysis from the household-centric literature and aligns it with recent work highlighting fundamental differences between business credit and household debt dynamics. In corporate credit markets, shutting down unproductive firms can under some conditions support an economic recovery by reallocating capital and labor (Bian, 2020; Antill and Clayton, 2025). However, factors such as weak demand, financing constraints, or institutional frictions can cause liquidations to be value-destroying (e.g., Barlevy, 2002; Caballero et al., 2008; Jordà et al., 2022). Whether the benefits of greater reallocation induced by stronger creditor rights outweighs the costs of excessive liquidation is an open empirical question.

Our analysis proceeds in three steps. First, we compile a new cross-country dataset covering 39 countries from 1978 through 2019 that combines corporate creditor rights indices (Djankov et al., 2007; Gurrea-Martinez, 2025) with data on macroeconomic outcomes and credit market aggregates, as well as newly-collected time series on non-performing loans, bankruptcies, and bank capitalization. We establish a new empirical fact: business credit booms are followed by significantly worse GDP outcomes in countries with weak creditor rights. These patterns are quantitatively important. A 10 percentage point increase in the business debt-to-GDP ratio over the past three years predicts a cumulative GDP loss of roughly 5 percentage points over the following five years in countries with the weakest creditor protections. In contrast, economies with the strongest creditor rights experience almost no decline in output. These patterns are robust to controlling for the level of economic and financial development, the efficiency of the bankruptcy system, quality of institutions, and types of credit booms. They hold in both advanced and emerging economies and are not driven by special episodes like the 2008 Great Financial Crisis.

Second, we examine potential mechanisms. In economies with weak creditor rights, business credit booms are followed by a steady accumulation of non-performing loans (NPLs) and an erosion of bank capital, but no differential likelihood of a credit crunch.[1] Instead, economies with strong creditor rights exhibit a spike in credit spreads, a decline in debt issuance by risky firms and greater reallocation of credit across sectors. These results suggest that creditor rights matter for how credit booms unwind through the reallocation of resources.

To causally identify evidence for these mechanisms at the firm level, we exploit a natural experiment based on the staggered adoption of antirecharacterization laws in certain

[1] Faster buildup of bad loans despite similar aggregate credit dynamics could suggest that weak creditors continue lending relationships with distressed borrowers rather than recognizing losses, consistent with loan evergreening or "zombie lending."

U.S. states. These legal changes strengthened secured creditors' claims on collateral pledged through special purpose vehicles (SPVs). Some U.S. states never adopted the reforms, while adopting states reformed at different points in time. Following Li et al. (2016) and other studies, we exploit the plausibly exogenous variation in creditor rights induced by these reforms within an otherwise homogenous institutional setting.

Using difference-in-differences designs, we compare the evolution of debt liabilities between different types of firms across states to test for a role of credit reallocation. We find that stronger creditor rights induce a sharp contraction in borrowing by risky firms (defined based on their ex-ante credit ratings). Importantly, this contraction is concentrated among firms with limited growth opportunities, as measured by a low Tobin's Q. In fact, risky firms with a high Q see stable or even higher debt issuance. Safe firms do not exhibit much of any response, consistent with a low default probability muting exposure to creditor rights reforms.[2]

To mitigate concerns about confounding dynamic factors that are specific to reforming states, we hand-collect data to proxy for firms' reliance on SPVs, which were at the heart of antirecharacterization laws. Using this pre-existing variation across firms *within* reforming states, we confirm that stronger creditor rights cause a reduction in risky, low-Q firms' debt issuance. Overall, these findings suggest that stronger creditor rights enable lenders to curtail lending to overleveraged firms while easing credit constraints for risky firms with a positive growth outlook.

Third and finally, we turn to an investigation of the nature of credit booms themselves. Our findings so far indicate that strong creditor rights may help cushion the blow of a credit boom gone bust. However, they do not address whether creditor rights influence the frequency, magnitude, or composition of the booms in the first place. We find that countries with stronger creditor protection experience larger and more frequent credit booms, consistent with an expansion in credit supply. Importantly, in these economies, booms are more responsive to productivity shocks and are accompanied by a faster resolution of bankruptcies. In other words, strong creditors extend credit more aggressively, but the resulting booms are more likely to reflect genuine improvements in productivity and less likely to culminate in prolonged balance-sheet weakness among banks and borrowers.

Taken together, our evidence suggests that the legal framework governing creditor-debtor relationships plays a first-order role for understanding boom-bust cycles. While stronger cred-

[2]These effects are robust to including the full set of state $\times$ time and firm risk $\times$ time fixed effects to control for unobserved shocks common to firms in the same state at a given time or to firms with similar risk profiles over time.

itor rights are associated with a higher likelihood of booms, they make the bust much less severe. We highlight that stronger creditor rights can encourage creditors to terminate lending to overleveraged firms while easing credit constraints for others with better growth opportunities.

Our findings also have potential implications for macroprudential policy. A growing literature emphasizes that private borrowing and lending decisions during credit booms generate systemic externalities that are not internalized by individual agents, motivating policy intervention to limit excessive leverage ex ante (Bianchi, 2011; Bianchi and Mendoza, 2018; Korinek and Simsek, 2016). In these frameworks, the social cost of leverage arises from balance-sheet distress and fire sales that depress aggregate demand and asset prices during downturns, amplifying economic contractions. Our results suggest that legal institutions governing default and enforcement shape these externalities by influencing both risk-taking during expansions and the allocation of losses during contractions. In this sense, creditor rights may interact with standard macroprudential tools by affecting not only the size of credit booms, but also the efficiency with which economies adjust once booms unwind.

Related Literature Our results connect to several strands of literature. First, we speak to the long-standing debate on the real effects of creditor rights. Existing work shows that stronger creditor protection is associated with more developed credit markets and better contract enforcement (La Porta et al., 1998; Djankov et al., 2007; Benmelech and Bergman, 2011). Other studies have emphasized potential downsides, showing that excessive creditor power can suppress productive risk-taking and induce inefficient liquidations during distress (Acharya and Subramanian, 2009; Acharya et al., 2011; Vig, 2013; Kornejew, 2025). Our work reconciles these views by focusing on cyclical dynamics. We show that creditor rights are not only relevant for the steady-state level of credit, but also for macro-financial linkages and financial stability. Specifically, we highlight the importance of stronger creditor rights for improving the reallocation of resources in the aftermath of credit booms.

Second, our paper contributes to the literature on credit cycles driven by financing frictions (Kiyotaki and Moore, 1997; Bernanke et al., 1999), which establishes that credit booms are frequently followed by economic contractions and episodes of financial distress (Schularick and Taylor, 2012; Mian et al., 2017; Borio and Lowe, 2002; Gourinchas and Obstfeld, 2012; Greenwood et al., 2022; Ivashina et al., 2024). We identify creditor rights as an important predictor of how credit booms unfold. Existing research has emphasized the role of the sectoral allocation of credit (Müller and Verner, 2023), productivity growth (Gorton and Ordoñez, 2020), and the

efficiency of bankruptcy institutions (Jordà et al., 2022; Kornejew et al., 2024). We highlight that the legal power afforded to creditors may be one underlying primitive in shaping credit cycle outcomes, beyond the general efficiency of bankruptcy procedures. Our findings also connect to the literature on macroprudential policy, which emphasizes that private agents do not internalize the systemic externalities created by leverage and fire sales during credit booms (Bianchi, 2011; Bianchi and Mendoza, 2018; Korinek and Simsek, 2016). We complement this work by showing that legal institutions governing creditor enforcement shape the magnitude and resolution of these externalities, influencing not only the build-up of credit, but also the efficiency with which economies adjust once booms unwind.

Third, we complement research on financial frictions, misallocation, and "zombie lending." Financial frictions can lead to an inefficient resource allocation, especially following periods of rapid credit growth (Midrigan and Xu, 2014; Gopinath et al., 2017). A prolonged period of misallocation is often associated with "evergreening" and "zombie lending" (Hoshi and Kashyap, 2004; Peek and Rosengren, 2005; Caballero et al., 2008; Giannetti and Simonov, 2013; Schivardi et al., 2021; Acharya et al., 2024). By highlighting a key role for strong creditors in facilitating a more efficient allocation of resources, we provide an empirical test of the framework proposed by Antill and Clayton (2025). In their model, liquidating distressed firms allows financially constrained banks to extend credit to solvent firms at lower rates. Accordingly, the optimal policy in response to fire sales may be to increase the rate of liquidations, preventing distressed borrowers from congesting bank balance sheets. Our analysis also speaks to Becker and Ivashina (2022), who link the low GDP growth following the 2007–08 crisis to weak insolvency regimes that fostered "zombie lending."[3]

2 Conceptual Framework and Testable Predictions

This section develops a framework for understanding how creditor rights shape the dynamics of credit booms and busts. We contrast two competing perspectives. The first, which we call the *amplification view*, sees strong creditor rights as a source of financial fragility, intensifying the expansion and contraction phases of the credit cycle. The second, the *dampening view*, emphasizes the stabilizing role of strong creditor protections operating through borrower discipline, balance sheet strength, and the reallocation of resources during downturns. These

[3]Relatedly, Bian (2020) studies an international coordination mechanism for the enforcement of strong creditor rights in the airline industry, which caused an increased reallocation of capital from less to more productive firms.

perspectives generate distinct predictions about how creditor rights influence both the formation of credit booms and the resolution of subsequent busts.

2.1 The Amplification View

The amplification view posits that stronger creditor rights exacerbate macroeconomic volatility by making credit provision more procyclical. The core insight is that creditor protection simultaneously expands credit supply during good times and accelerates liquidation during downturns. When economic conditions are favorable, enhanced recovery prospects encourage aggressive lending, particularly to riskier borrowers. However, the ability of creditors to seize assets and force liquidation can also trigger fire sales and amplify downturns when widespread distress occurs.

This view emphasizes the adverse effects of creditor control rights. Stronger creditor rights improve the outside option of creditors in renegotiation, as in Hart and Moore (1998) and Holmström and Tirole (1997, 1998). This improvement in creditors' bargaining position raises the ex-ante pledgeability of cash flows, thereby expanding credit supply. However, because liquidation values move procyclically, the same mechanism also exacerbates asset sales when resale prices are low, deepening the economic downturn (Shleifer and Vishny, 1992).

Higher pledgeability creates a tighter link between borrowing and collateral values or net worth, as emphasized in the frameworks of Kiyotaki and Moore (1997) and Bernanke et al. (1999). When collateral values rise, borrowers can pledge more of their returns to creditors, fueling credit expansion. When these values fall, a sharp contraction in borrowing capacity follows. Additionally, stronger creditor rights alter the resolution of financial distress by tilting outcomes toward liquidation rather than reorganization (Aghion et al., 1992).

While a preference for liquidation may improve recovery rates during normal times, it can prove destabilizing during downturns by fueling costly fire sales. Diamond and Rajan (2001, 2011) demonstrate how creditor control rights can destabilize banks when collateral values fall, while Drozd and Serrano-Padial (2018) show how stronger enforcement can accelerate liquidation during downturns, creating a feedback loop that further depresses asset prices.

Empirical work supports the relevance of these theoretical predictions. Cross-country studies consistently show that stronger creditor protections are associated with deeper credit markets (La Porta et al., 1998) and more favorable loan terms (Qian and Strahan, 2007; Bae and Goyal, 2009; Haselmann et al., 2010). Pence (2006) and Dagher and Sun (2016) use differences in foreclosure procedures across U.S. states as a natural experiment, showing that nonjudicial

foreclosure—which strengthens creditor rights by bypassing court approval—leads to both larger mortgage loans and lower interest rates. Because credit supply is highly procyclical, in that credit risk is high during the boom (Greenwood and Hanson, 2013; Kirti, 2025) but credit spreads are low (Krishnamurthy and Muir, 2017; Mian et al., 2017), strong creditors can act as an amplifying factor. Houston et al. (2010) provide indirect evidence by showing that stronger creditor rights correlate with higher bank riskiness and an increased probability of banking crises.

While stronger creditor rights facilitate faster insolvency resolution and higher recovery values, this occurs partly through increased liquidation rather than reorganization (Davydenko and Franks, 2008; Djankov et al., 2008; Rodano et al., 2016). The costs of this liquidation bias became evident during the 2007-08 financial crisis. Mian et al. (2015) find that U.S. states with nonjudicial foreclosure experienced not only more foreclosures, but also larger house price drops and deeper output losses. Relatedly, in recent work, Kundu (2021) shows that covenant-driven fire sales in collateralized loan obligations propagate financial distress to otherwise unaffected firms, highlighting how contractual enforcement can amplify downturns through forced asset liquidations.

These negative liquidation spillovers extend beyond the distressed firms themselves. For instance, Bernstein et al. (2019a) show that liquidation can lead to an inefficient allocation of assets in bankruptcy, and Bernstein et al. (2019b) document harmful spillover effects on nearby firms. The implication is that, while strong creditor rights may protect individual lenders, they can make economy-wide downturns more severe by leading to excessive liquidation of borrowers.

2.2 The Dampening View

The dampening view holds that stronger creditor rights stabilize the economy through three interconnected mechanisms operating at different stages of the credit cycle: ex-ante borrower discipline, balance sheet protection, and efficiency of capital reallocation. According to this view, stronger creditor rights may increase credit supply, but they also limit excessive risk-taking before loans are extended and accelerate the resolution of defaults.

The first mechanism operates through ex-ante borrower discipline. When borrowers know that creditors can more effectively seize control and liquidate assets in default, they face stronger incentives to avoid getting into distress. Holmström and Tirole (1997, 1998) show that stronger enforcement increases the share of project returns that can be credibly pledged to investors,

making shirking less attractive and reducing moral hazard. In Hart and Moore (1998), creditor control rights strengthen repayment incentives by raising the cost of diversion. The threat of losing control thus has a disciplining effect on firms' risk-taking behavior (Aghion et al., 1992; Shleifer and Vishny, 1992). Collateral constraints of the type in Kiyotaki and Moore (1997) limit borrowing to the value of seizable assets, implying that strong creditors should lower borrowers' willingness to pledge collateral and thus dampen boom-bust cycles.

The second mechanism works through balance sheet protection. Empirical evidence shows that strong creditor protections lead to higher recovery values, less strategic default, and lower loan losses (Davydenko and Franks, 2008; Rodano et al., 2016; Ghent and Kudlyak, 2011; Tantri, 2020; Heitz and Narayanamoorthy, 2021). This creates equity buffers that can absorb negative shocks without forcing sharp contractions in credit supply. In theoretical frameworks such as He and Krishnamurthy (2013) and Brunnermeier and Sannikov (2014), bank balance sheet strength is important for stabilizing the economy, because well-capitalized banks can continue lending even during downturns. The dampening effect extends to borrower balance sheets as well: firms that face stronger disciplinary incentives during booms are more likely to maintain higher net worth during the bust, which would stabilize the economy in financial accelerator models (Bernanke et al., 1999).

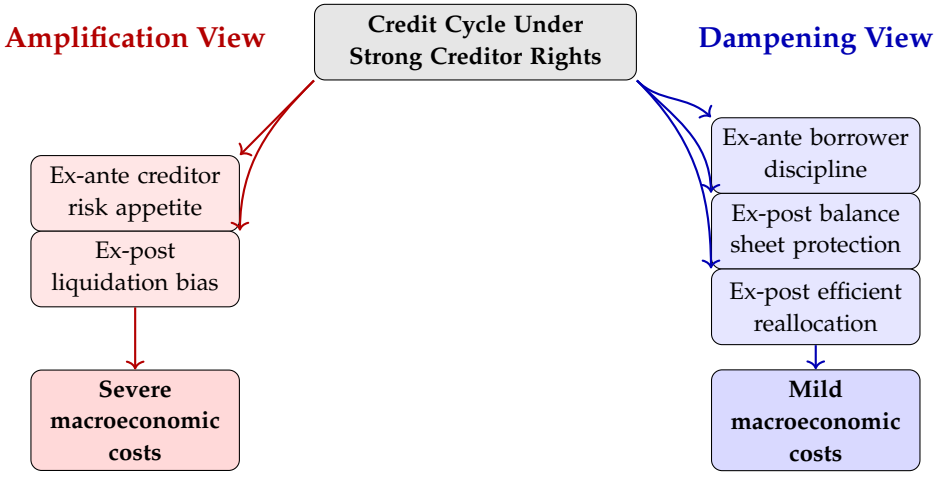
The third mechanism operates through the efficiency of capital reallocation. The framework of Aghion et al. (1992) shows how transferring control to creditors can improve the allocation of underperforming assets by moving them to more productive users. In Antill and Clayton (2025), the ability to liquidate distressed firms makes financially constrained banks extend new credit to solvent firms at lower rates. As such, stronger creditor rights could help prevent "zombie lending." Empirical evidence suggests that zombie lending significantly drags down economic growth (Hoshi and Kashyap, 2004; Peek and Rosengren, 2005; **?**; Giannetti and Simonov, 2013; Schivardi et al., 2021; Acharya et al., 2024), particularly when bankruptcy systems function poorly (Jordà et al., 2022; Kornejew et al., 2024). Bian (2020) shows that strong creditor rights in the airline industry facilitate capital reallocation across firms. Becker and Ivashina (2022) provide evidence that more efficient insolvency proceedings are correlated with higher GDP growth following the 2007-08 Global Financial Crisis.

2.3 Empirical Predictions

Figure 1 illustrates these competing theoretical perspectives, which make distinct empirical predictions. While both mechanisms likely operate in practice, we can test which view is more

useful for describing equilibrium relationships in the data.

Figure 1: Conceptual Framework



Notes: This figure summarizes the two competing theoretical perspectives on how creditor rights influence credit cycle dynamics by shaping creditor and borrower behavior both before and after potential defaults. The amplification view highlights procyclical effects, where stronger creditor rights amplify booms through elevated risk-taking and intensify busts through excessive liquidations. The dampening view highlights stabilizing mechanisms operating through ex-ante discipline, balance sheet protection, and an efficient reallocation of resources. Our empirical analysis tests which view better describes equilibrium outcomes.

Boom dynamics Under the amplification view, stronger creditor rights should increase both the probability and severity of credit booms, because the prospect of higher recovery rates encourages lenders to extend credit more aggressively in response to positive shocks. Conversely, the dampening view predicts that strong creditor protections reduce the intensity of booms by deterring excessive borrowing through ex-ante disciplinary effects.

Depth of recessions The amplification hypothesis implies that countries with stronger creditor rights should experience deeper and more persistent recessions following credit booms, as excessive liquidation and fire sale externalities amplify the initial downturn. The dampening view suggests the opposite: stronger creditor rights should mitigate the severity of recessions by preserving the net worth of banks and borrowers.

Bank health During downturns following a credit boom, the amplification view predicts that stronger creditor rights are correlated with larger increases in non-performing loan ratios and sharper declines in bank equity values, reflecting the destabilizing effects of widespread liquidation. Under the dampening view, enhanced creditor protections should insulate banks from

losses and capital erosion through higher recovery rates in bankruptcy proceedings, which mechanically reduce loan losses and preserve bank net worth when borrowers default.[4]

Credit allocation The amplification view suggests that stronger creditor rights exacerbate adverse selection during booms, channeling a disproportionate amount of credit toward riskier borrowers. By contrast, the dampening view implies that enhanced creditor protections reduce evergreening incentives, leading to more conservative lending standards and lower credit growth to firms with poor fundamentals.

In sum, amplification and dampening views of creditor rights and credit cycles provide us with several testable predictions. In our empirical work, we test these in three stages. First, in Section 4.2, we examine whether stronger creditor rights dampen or amplify the contractions that follow credit booms. Second, in Sections 4.3 and 5, we explore the underlying mechanisms by analyzing the link between creditor rights and credit allocation, bank health, and the resolution of financial distress. Third, in Section 6, we assess whether stronger creditor rights increase the ex-ante likelihood or magnitude of credit booms. Together, these tests allow us to determine whether creditor rights act primarily as amplifiers or dampeners of credit cycles.

3 Data Sources and Description

3.1 Cross-Country Data

We assemble a cross-country panel dataset of macroeconomic and financial information at the annual frequency from several sources, covering 39 countries from 1978 to 2019.[5] Our sample includes both advanced and emerging economies, spanning a wide range of legal institutions, levels of financial development, and macroeconomic conditions.

Creditor Rights Indices We construct a composite measure of creditor rights by combining two complementary datasets that together provide the most comprehensive time series coverage possible.

Our primary source is the creditor rights index from Djankov et al. (2007), which builds on the foundational work of La Porta et al. (1998). This index captures four key legal fea-

[4] It should be noted that banking sector outcomes partly reflect the overall severity of economic downturns rather than an independent effect on financial stability.

[5] We end our sample in 2019 to avoid the COVID-19 pandemic. We also exclude countries with a population of less than 5 million.

tures that define creditor protections when corporate borrowers experience financial distress: (1) restrictions on reorganization procedures, (2) automatic stay provisions, (3) secured creditor payment priority, and (4) management retention during reorganization. The index covers 133 countries over 1978-2003, with values ranging from 0 (weakest creditor protection) to 4 (strongest protection).

To extend coverage beyond 2003, we incorporate the secured rights index from Gurrea-Martinez (2025), which provides detailed measures of corporate bankruptcy laws for 53 countries from 2000 to 2023. This index focuses specifically on the legal rights of secured creditors and incorporates recent reforms, making it conceptually closest to the Djankov et al. (2007) measure. Appendix Figure A.1 shows a strong positive correlation ($\rho = 0.407$) between these indices across countries in 2003, supporting the validity of combining them into a single measure.

To create consistent time series, we standardize both indices using percentile rank transformations:

$$L_{i,t} = \begin{cases} \frac{1}{n^D} \sum_j^{n^D} \mathbb{1}(L_j^D \leq L_{i,t}^D) & \text{if } t \leq 2003 \\ \frac{1}{n^G} \sum_j^{n^G} \mathbb{1}(L_j^G \leq L_{i,t}^G) & \text{if } t > 2003 \end{cases}$$

where L^D and L^G denote the Djankov et al. (2007) and Gurrea-Martinez (2025) indices, and n^D and n^G are their respective sample sizes. This transformation maps both indices to the unit interval [0,1], where values near 1 indicate the strongest creditor protection regimes. For the overlapping period 2000-2003, we prioritize the Djankov et al. (2007) index to maintain continuity with the extensive literature using this measure. Appendix Figure A.2 illustrates the composite index $L_{i,t}$ for all country-year observations with coverage on key macroeconomic variables, including aggregate firm credit. In robustness checks, we show our results also hold using alternative ways of measuring creditor rights and that they do not depend on how we combine these indices.

Credit and Macroeconomic Data We obtain comprehensive data on credit to the private sector from the Bank for International Settlements (BIS). The BIS provides data on total debt securities and loans to non-financial corporations, covering 43 countries between 1980 and 2019. Our main variable of interest is the ratio of business debt to GDP, which serves as our primary measure of a credit expansion, given that the creditor rights indices specifically pertain to firm insolvency. We also collect household credit data from the BIS to control for concurrent credit market dynamics in mortgages and consumer credit.

To examine the reallocation of credit across sectors, we use data from Müller and Verner (2023), which includes outstanding bank credit by economic sector (e.g., agriculture, manufacturing, construction, real estate, services) for 120 countries from 1940 to 2014.

Standard macroeconomic indicators, including real GDP, consumer prices, gross fixed capital formation, and current account balances, are drawn from the IMF's World Economic Outlook database.

Banking Sector and Credit Quality Indicators We hand-collect data on banking sector health to examine the link between creditor rights and financial stability. Specifically, we collect data on the ratio of non-performing loans (loans in arrears by 90+ days), capital adequacy ratios, and aggregate banking sector capitalization, sourced from national central banks and the IMF's Financial Soundness Indicators.

To capture changes in the riskiness of firm debt issuance, we use the share of newly issued corporate bonds rated below investment grade ("high-yield share") from Kirti (2025). We also collect data on annual corporate bankruptcy filings from national statistical offices and CEIC, providing a direct measure of financial distress resolution.

Institutional Controls We incorporate several variables on country's institutional environment. The bankruptcy efficiency index from Kornejew et al. (2024) captures the overall quality of insolvency proceedings, which allows us to separate the role of creditor protection from general institutional capacity. To account for systemic financial crises, we use the banking crisis chronology from Baron et al. (2021). Finally, we use total factor productivity (TFP) data from the Penn World Tables to examine how creditor rights interact with fundamental productivity shocks.

U.S. Microeconomic Data

To complement our cross-country analysis, we construct a firm-level dataset covering publicly listed U.S. companies from 1995 to 2004. These data are well-suited for our identification strategy, which relies on firms using special purpose vehicles (SPVs).

Firm-level quarterly financial statements, stock prices, credit ratings, and the state of incorporation are obtained from *Compustat* North America. We exclude financial firms (SIC codes 6000–6999) and public administration entities (SIC codes 9000–9999). Following Feng et al. (2009), we manually collect data on subsidiaries from Exhibit 21 of firms' 10-K filings with the

Securities and Exchange Commission. Subsidiaries organized as limited liability companies (LLCs) or limited partnerships (LPs) are classified as potential SPVs, which provides us with a novel proxy for firm-level exposure to antirecharacterization law reforms.

We construct multiple measures of firm-level risk. Credit risk is primarily based on S&P long-term issuer ratings, supplemented with Altman z-scores calculated from standard financial ratios, shown below.

$$\begin{aligned}\text{Altman Z-Score} = 1.2 \cdot \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \cdot \frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3 \cdot \frac{\text{EBIT}}{\text{Total Assets}} \\ + 0.6 \cdot \frac{\text{Market Value of Equity}}{\text{Total Liabilities}} + 1.0 \cdot \frac{\text{Sales}}{\text{Total Assets}} \end{aligned} \tag{1}$$

To capture investment opportunities, we compute market-to-book ratios (Tobin's Q).

3.2 Sample Coverage and Descriptive Statistics

Our final cross-country dataset used for the estimations includes 39 economies, spanning 1980–2019. Table 1a reports descriptive statistics for the key variables in our regression sample.

The composite creditor rights index exhibits wide variation, ranging from the 0.5^{th} to the 99.9^{th} percentile. The median observation in our regression sample sits at the 69th percentile of the index distribution.[6] The business debt-to-GDP ratio averages at 72.6% and exhibits substantial variation: 20% of observations show three-year changes outside the [-9.4 pp., +13.8 pp.] interval, indicating considerable cyclical fluctuations in corporate debt.

Our U.S. firm-level sample, summarized in Table 1b covers 1,685 unique firms from 1995Q1 to 2004Q4. Approximately 10% of firm-quarter observations are subject to state legislation that expands creditor rights. We also examine a subsample of risky firms rated B+ or worse, which comprise roughly 25% of firm-quarter observations.

4 Creditor Rights and the Aftermath of Credit Booms

This section presents cross-country panel evidence on how the aftermath of credit booms differs under strong versus weak creditor rights regimes. We establish the empirical relationship

[6] This reflects the discrete nature of the underlying indices, particularly the 4-step index from Djankov et al. (2007), rather than sample skewness. The mean index percentile is 58.4 in the regression sample versus 58.1 in the full sample. See Appendix Table A.1 for summary statistics based on the full available sample for each variable.

Table 1: Summary Statistics

(a) Cross-Country Data

	Regression sample					
	N	Mean	SD	Q10	Q50	Q90
Creditor Rights (index percentile)	803	58.4	28.8	15.7	69.0	92.8
Business debt-to-GDP ratio (%)	803	72.6	32.8	27.9	70.4	117.7
Business debt-to-GDP ratio, 3-year change (pp.)	803	2.2	10.3	-9.4	2.1	13.8
Real GDP growth, annual (%)	803	3.0	4.0	-0.9	2.9	7.1
Share of nonperforming loans (%)	604	4.9	6.1	1.0	2.9	10.3

(b) U.S. Firm-Level Data

	Regression sample					
	N	Mean	SD	Q10	Q50	Q90
Growth of long term debt, quarterly (%)	31,453	-0.4	41.8	-12.1	-0.8	14.8
Debt-to-asset ratio	31,453	0.4	0.2	0.2	0.4	0.7
Growth of sales, annual (%)	31,453	8.0	35.3	-18.3	4.6	39.5
Tobins Q	31,453	1.7	1.2	0.9	1.4	2.7
S&P rating (AAA=0, D=23)	31,453	9.8	3.7	5.0	10.0	14.0

Notes: These tables presents summary statistics for the key variables used in the analysis. Panel (a) shows statistics for the cross-country panel dataset. Panel (b) shows statistics for U.S. firm-level data.

with GDP before examining other outcomes that shed light on potential transmission channels.

4.1 Methodology

To examine the role of creditor rights in understanding the macroeconomic consequences of credit cycles, we build on the literature linking credit booms to subsequent slowdowns in economic activity (e.g., Mian et al., 2017; Jordà et al., 2022; Müller and Verner, 2023). We estimate a state-dependent local projection model that allows the aftermath of credit expansions to vary across institutional regimes:

$$\Delta_h \log(y_{i,t+h}) = \alpha_{i,h} + \beta_{1,h}\Delta_3 c_{i,t} + \beta_{2,h}\Big(\Delta_3 c_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{2}$$

where $h \in \{1, 2, \ldots, 5\}$ indexes the forecast horizon, $y_{i,t}$ is real GDP in country i and year t, $c_{i,t}$ is the business debt-to-GDP ratio, and $L_{i,t}$ is our composite creditor rights index defined in Equation (3.1). The key coefficient of interest, $\beta_{2,h}$, captures how the macroeconomic conse-

quences of credit booms differ depending on the strength of creditor protection. As outlined above, we focus on business debt because the creditor rights indices refer to the resolution of firm insolvency.

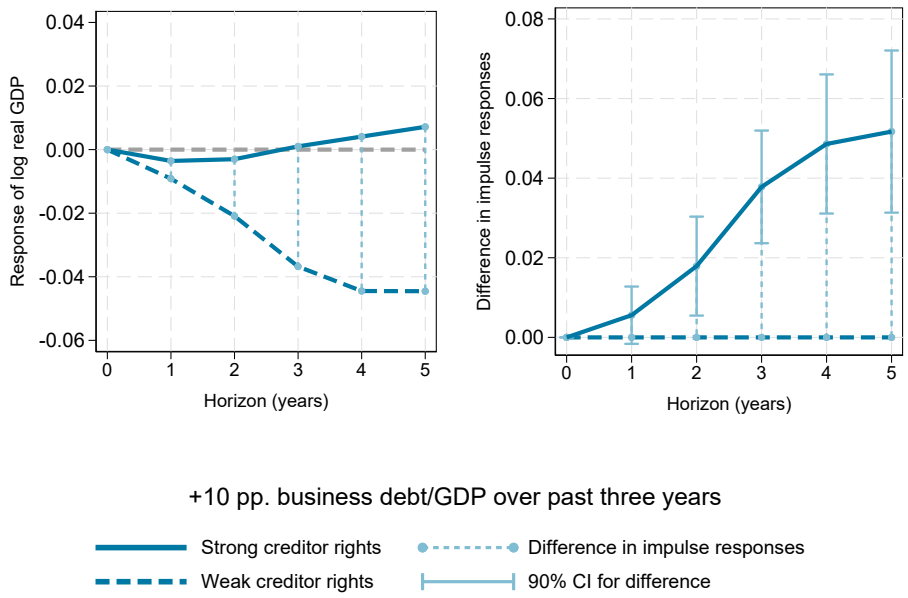
The vector of controls, $\boldsymbol{x}_{i,t}$, includes lagged real GDP growth and the contemporaneous change in household debt-to-GDP, allowing us to disentangle the role of business credit from broader credit market dynamics. We also include horizon-specific country fixed effects, $\alpha_{i,h}$, to absorb time-invariant differences across countries, such as long-standing institutional and structural characteristics.

A potential concern with interpreting the estimates of equation 2 is that differences in creditor rights are correlated with other country characteristics. We address this concern in three ways: (1) by extensively controlling for economic development, financial depth, and overall institutional quality; (2) by contrasting creditor rights with debtor protections, and (3) by exploiting a natural experiment exploiting staggered legal reforms across U.S. states in Section 5.

4.2 Main Results

Figure 2 presents our central finding: credit booms predict dramatically different macroeconomic outcomes depending on the strength of creditor protection. In countries with the weakest creditor rights ($L_{i,t} = 0$), a 10 percentage point increase in business debt-to-GDP over three years predicts cumulative real GDP losses of approximately 4 percentage points over the subsequent five years. By contrast, in countries with the strongest creditor rights ($L_{i,t} = 1$), similar booms are followed by little to no output loss. By year five, the gap in cumulative GDP between the two groups reaches about 5 percentage points.

Figure 2: Creditor Rights and Real GDP After Business Credit Booms



Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt-to-GDP ratio over the preceding three years. The right panel plots the impulse response of real GDP for economies with the strongest creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and for economies with the weakest creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as a dashed line. The left panel plots the difference between those impulse responses ($\hat{\beta}_{2,h} \times 0.1$) with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

These differences are economically large and speak to the two competing theoretical perspectives on how creditor rights may affect macroeconomic stability. The amplifying view holds that strong creditor rights worsen recessions by enabling rapid liquidation and inefficient fire sales, deepening post-boom contractions through excessive liquidation and financial contagion (e.g., Shleifer and Vishny, 1992). The dampening view instead argues that strong creditor rights mitigate credit cycle volatility through three interconnected mechanisms: ex-ante borrower discipline that prevents excessive risk-taking during booms, superior ex-post credit reallocation that quickly redirects capital from failing to viable firms, and reduced bank incentive distortions that prevent zombie lending (e.g., **?**Jordà et al., 2022). Our baseline results support that the dampening view dominates empirically.

Boom-Bust Asymmetry Having established that creditor rights matter for the severity of busts following credit expansions, we examine the symmetry of this relationship across the credit cycle. Specifically, Appendix Figure A.3 distinguishes between credit expansions and contractions by using local projections that allow for sign asymmetry as in Ben Zeev et al.

(2023).[7]

The results reveal a striking asymmetry: strong creditor rights primarily predict economic outcomes differentially following credit *booms*, with limited differences after credit *contractions*. This pattern suggests that creditor rights matter when many borrowers become distressed, which occurs after credit expansions rather than after contractions. This finding motivates our focus in the next section on understanding *how* creditor rights affect the resolution of post-boom distress.

Robustness Before investigating the mechanisms behind these differential outcomes, we address whether the results simply reflect systematic differences in boom characteristics rather than post-boom resolution. Specifically, Appendix Figure A.10a controls for whether the boom is driven by lending to the real estate sector, given the role of such credit expansions in economic downturns (Müller and Verner, 2023; Ivashina et al., 2024). Appendix Figure A.10b controls for the share of debt issued by risky firms, based on the predictive ability of measures of credit quality in cross-country data documented by Kirti (2025)). The results remain highly similar, confirming that we do not merely capture differences in the nature of the boom.

We conduct a series of additional robustness checks to verify that our results are not driven by confounding factors or modeling choices. Specifically, we show that the findings hold when we (i) account for various dimensions of economic development, (ii) control for the overall quality of bankruptcy institutions, and (iii) use alternative approaches to measuring creditor rights. Appendix Table A.2 presents coefficient estimates and regression diagnostics for each horizon.

Economic Development. We test whether creditor rights proxy for broader economic development by controlling for GDP per capita levels and their interaction with credit growth. As shown in Appendix Figure A.4a, the estimates remain virtually unchanged, indicating that our findings reflect specific institutional differences rather than the overall level of development. Similarly, controlling for financial depth measured by lagged credit-to-GDP levels and their interaction with credit growth does not affect our conclusions. The results, shown in Appendix Figure A.4b, are very similar to the baseline estimates, suggesting that creditor rights retain their predictability independent of their role in explaining financial development. Finally, we divide the sample into advanced and emerging market economies based on the median GDP

[7] To isolate changes in credit growth rather than GDP, we use the three-year change of log real business credit, rather than the ratio of business credit to GDP.

per capita and re-estimate Equation 2 for each group. Appendix Figure A.5 shows remarkably consistent results across both sets of countries.

Quality of Bankruptcy Laws. We test whether creditor rights are merely a proxy for general bankruptcy efficiency, which has been shown to mitigate macroeconomic fallout from credit booms (Jordà et al., 2022; Kornejew et al., 2024). First, we test whether creditor rights merely proxy for overall bankruptcy system quality using the efficiency measure from Kornejew et al. (2024). As shown in Appendix Figure A.4c, creditor rights continue to predict a distinct path of output following credit booms, beyond what can be explained by procedural efficiency alone. This points to creditor enforcement, rather than general bankruptcy effectiveness, as the relevant channel.

Second, we contrast creditor rights with measures of debtor protections using the debtor rights indices from Gurrea-Martinez (2025). While well-designed bankruptcy regimes may protect both creditors and debtors (Gurrea-Martinez, 2025), a natural concern is that our results simply reflect broader legal quality rather than creditor rights per se. If this were the case, stronger debtor protections should be associated with similarly muted macroeconomic responses to credit booms. Instead, we find the opposite pattern: stronger debtor rights are, if anything, associated with worse GDP outcomes following credit booms (Appendix Figure A.6). This directional difference is consistent with the dampening view, in which stronger creditor enforcement facilitates loss recognition and reallocation, while stronger debtor protections may prolong distress by delaying restructuring and liquidation.

Creditor Rights Measures. Our results are stable across alternative measurement approaches. Appendix Figure A.7 shows consistent results when using either the Djankov et al. (2007) or Gurrea-Martinez (2025) indices. A particular measurement challenge arises because Gurrea-Martinez (2025) classifies multiple bankruptcy procedures within a given country. Without reliable data on the relative utilization of different procedures, we adopt the maximum creditor rights across procedures as our baseline measure, which yields the strongest correlation with that of Djankov et al. (2007) during the overlapping period. Appendix Figure A.8 demonstrates that our results remain robust when we use alternative definitions of creditor rights from Gurrea-Martinez (2025). Specifically, we re-estimate the analysis using (i) the bankruptcy procedure offering the weakest protection for secured creditors, and (ii) the procedure offering the strongest protection for debtors. The second approach reflects the fact that, in many jurisdictions, debtors can strategically select among available procedures.

To address potential concerns about our index splicing methodology, we test the results separately before and after 2003, when the Djankov et al. (2007) ends and the Gurrea-Martinez (2025) begins. Appendix Figure A.9 demonstrates that our core results hold in both periods, confirming that our findings are not driven by changes in measurement methodology or the 2007-08 Global Financial Crisis.

These robustness checks consistently support our interpretation that creditor rights themselves, rather than correlated institutional or macroeconomic features, are what predicts the heterogeneous aftermath of credit booms.

4.3 Mechanisms

Why do economies with weak creditor rights suffer persistent output losses after business credit booms, while those with strong rights largely avoid them? Having established that business credit booms are followed by significantly worse GDP outcomes in countries with weak creditor rights, we now turn to other outcomes to investigate potential mechanisms. Our framework described in Section 2.2 highlights three potential mechanisms through which creditor rights may affect post-boom dynamics: (i) ex-ante borrower discipline affecting both debt issuance and investment choices during booms, (ii) the efficiency of credit reallocation during the bust, reflecting how swiftly capital is redeployed from insolvent to viable firms, and (iii) stronger financial intermediary balance sheets, which insulate banks from losses during downturns.

The data support the idea that weak creditor rights lead to continued lending to risky borrowers without appropriate risk compensation, limited reallocation of credit across firms, rising non-performing loans, and deteriorating banking sector health. We interpret these facts as indicative of an inefficient reallocation of resources during the bust.

Banking Sector Health and Balance Sheet Effects Stronger creditor rights affect bank asset quality through two mechanisms. First, they enhance recovery rates conditional on default. Second, they reduce moral hazard by discouraging excessive risk-taking among borrowers, thereby lowering default probabilities. Both mechanisms imply lower non-performing loan (NPL) ratios.

We test this hypothesis using a new, hand-collected dataset on NPLs. Figure 3a plots the results of local projections as in equation 2, where the dependent variable is the ratio of NPLs.

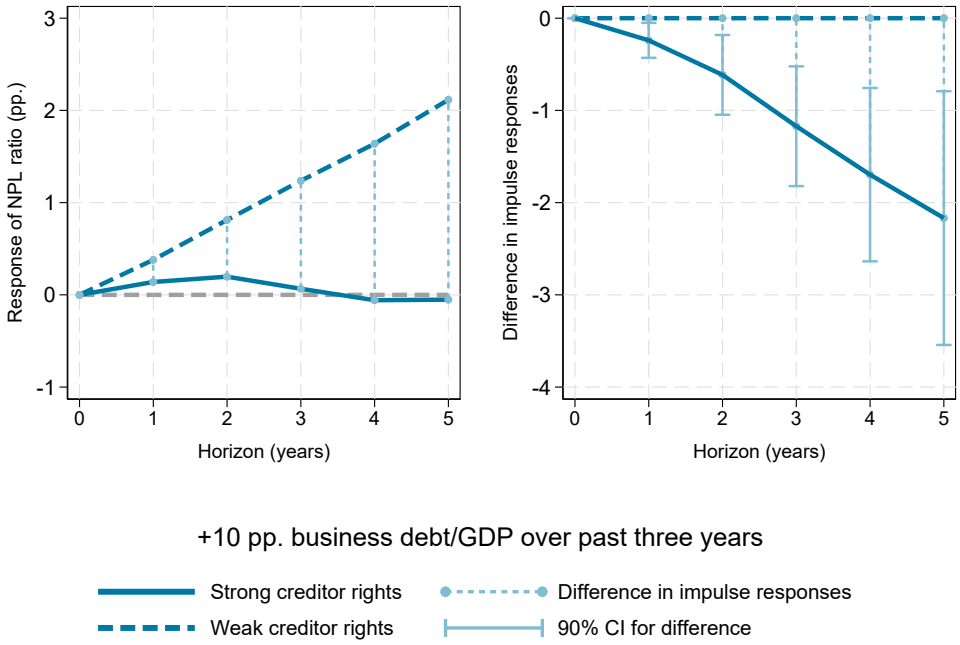
We find that credit expansions lead to significantly larger increases in NPLs in countries with weak creditor rights.

To test whether the lower NPLs in countries with strong creditors translate into more resilient bank balance sheets, we turn to two measures of bank capitalization. First, we use data on the market value of bank capital as reflected in bank equity returns from Baron et al. (2021). Figure 3b shows that banks in countries with weaker creditor rights experience sustained declines in the market value of bank capital. These patterns may reflect the lower recovery rates that amplify loan losses, but also potentially that banks may face greater incentives to defer loss recognition on problem loans.

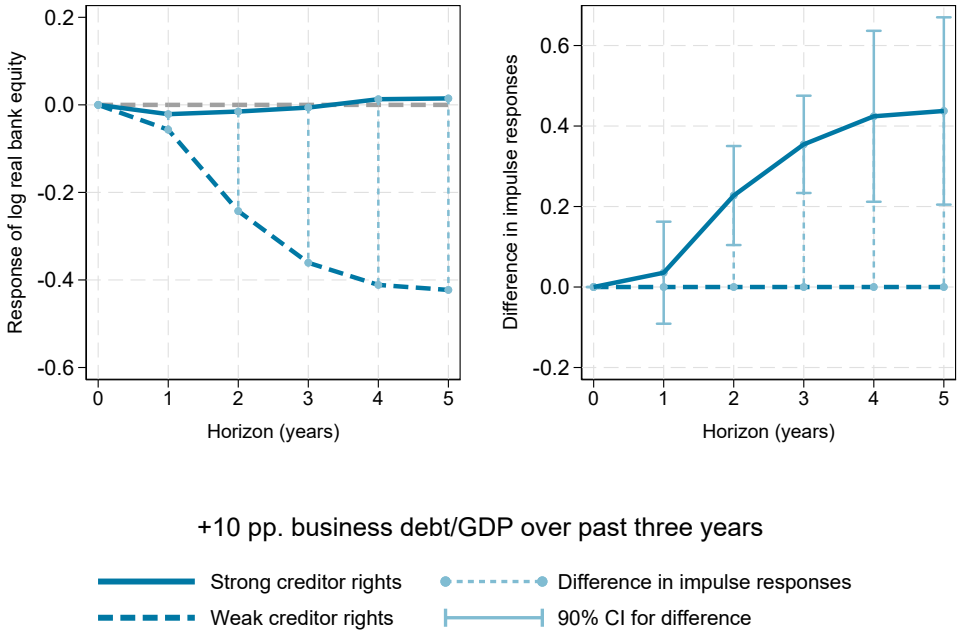
Second, we use newly collected data on bank capital ratios, which measure the value of the banking sector's book capital relative to total assets. Appendix Figure A.11a finds complementary results: credit expansions in countries with strong creditor rights are associated with more stable bank capital ratios, consistent with our results on the market value of equity.

Figure 3: Creditor Rights, Credit Risk, and Bank Balance Sheets

(a) Nonperforming Loans



(b) Bank Equity Returns



Notes: These figures show impulse responses estimated from local projections following a 10 percentage point increase in the business debt-to-GDP ratio over three years. Panel (a) plots the response of the share of non-performing loans, based on hand-collected data from the national central banks and the IMF Financial Soundness Indicators. Panel (b) plots the response of bank equity (log) returns using data from Baron et al. (2021). Each local projection controls for the contemporaneous value as well as five lags of the dependent variable, real GDP growth, and changes in the household debt-to-GDP ratio. Within each panel, the right graph plots the impulse response for a 10 percentage points increase in the business debt-to-GDP ratio over three years under strong creditor rights ($L_{i,t} = 1$) as the solid line and under weak creditor rights ($L_{i,t} = 0$) as the dashed line. The left graphs plot the difference between those impulse responses, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

Aggregate Credit Dynamics The sharper economic downturn following credit booms in countries with weak creditor rights may partly reflect reduced bank net worth, translating into a credit crunch. Faced with higher loan losses, banks may derisk by contracting new lending, precipitating the downturn. These dynamics may be particularly pronounced when the banking sector experiences a systemic crisis.

Appendix Figure A.12 tests this prediction across two dimensions. Appendix Figure A.12a examines changes in aggregate business debt, while Appendix Figure A.12b examines the probability of a systemic financial crisis—the most extreme form of credit disruption.

We find relatively limited evidence that creditor rights are associated with a credit crunch or a higher probability of crisis. This should be interpreted with caution, as the credit data measures outstanding amounts, including non-performing debt that has not been written off. Consequently, the modest contraction we observe could reflect either reduced net lending or a higher share of distressed debt remaining on banks' books, suggesting a reluctance to write off such loans.

Nevertheless, we find little evidence that creditor rights significantly alter the likelihood of systemic banking crises. While banking sector health clearly worsens after credit booms when creditor protections are weak, this deterioration does not inevitably trigger full-scale crises, which are usually linked to deep economic contractions (e.g., Schularick and Taylor, 2012).

Credit Reallocation The modest differences in aggregate credit dynamics shift our focus to allocative efficiency as the key channel through which creditor rights affect macroeconomic outcomes. Our framework predicts that creditor rights are an important determinant of whether banks continue lending to unproductive firms or redirect capital toward productive uses. Under weak creditor rights, banks facing poor recovery prospects may have incentives to "gamble for resurrection" by continuing to lend to risky borrowers in hopes of avoiding loss recognition. Strong creditor rights, by contrast, should enable banks to foreclose and restructure promptly, facilitating creative destruction and efficient reallocation from failing to viable firms.

To test these potential mechanisms, we measure the allocation of credit across sectors using data from Müller and Verner (2023). This allows us to compute, for each country-year pair, the vector of sectoral shares in total business credit. To the extent that credit reallocation crosses sectoral boundaries, it alters this vector over time. We, therefore, use the Euclidean distance between a country's shares as an index of credit reallocation.

Figure 4a plots the estimates from a local projection based on Equation (2), where the de-

pendent variable is the Euclidean distance between the sectoral business debt allocation vectors at $t+h$ and t.

$$\text{CR}_{c,t,h} = \sqrt{\sum_{i=1}^{N} \left(s_{i,c,t} - s_{i,c,t-h}\right)^2}$$

where $CR_{c,t,h}$ is the credit reallocation index for country c between year t and $t+h$. $s_{i,c,t}$ is the share of total business credit allocated to sector i in country c at time t, and N represents the total number of sectors. We control for the degree of credit allocation during the boom by measuring the Euclidean distance between sectoral business debt allocation vectors at t and $t-3$.

We find that business credit booms are followed by increased credit reallocation activity where creditors are well protected. After three years, the degree of reallocation reaches an index value of +0.005, nearly doubling the full sample average three-year change of 0.008. By contrast, under weak creditor rights regimes, credit reallocation activity falls below steady-state levels.

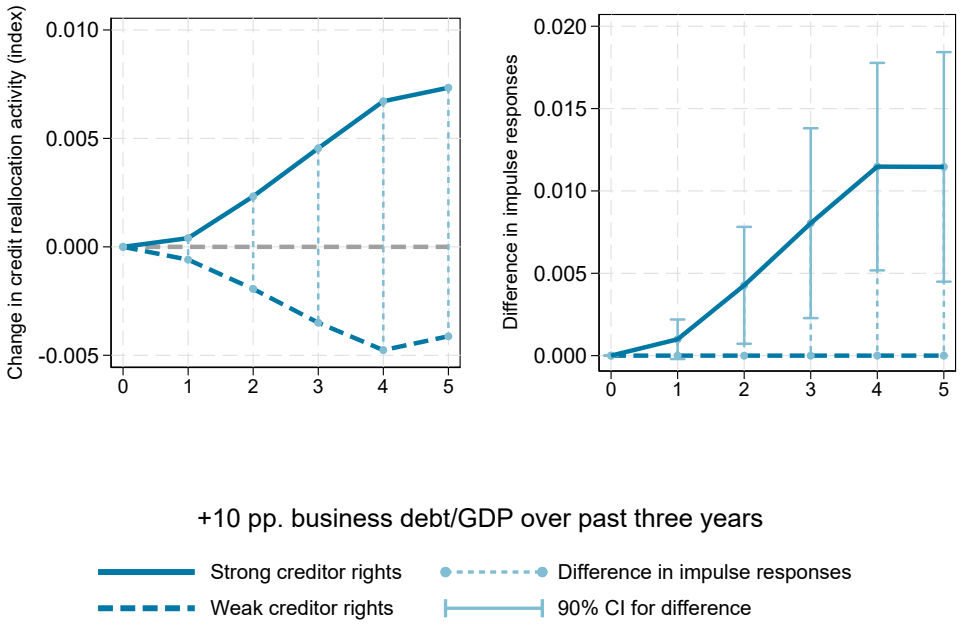
We also find evidence that, where creditor rights are stronger, the aftermath of credit booms is associated with a reduction in credit to risky firms. Figure 4b plots these results. Using data on the riskiness of corporate bond issuance from Kirti (2025), we show that the share of high yield issuance declines sharply after booms where creditor rights are strong but remains elevated where they are weak. Appendix Figure A.11b shows that this decline in risky debt issuance in countries with strong creditor rights is associated with a spike in credit spreads, while no such spike occurs under weak creditor rights.[8]

Taken together, these patterns suggest that weak creditor rights are associated with a limited reallocation of credit following credit booms. Risky firms continue borrowing without paying commensurate risk premia. These findings are consistent with weak creditor rights encouraging banks to engage in "zombie lending" rather than writing off losses and reallocating

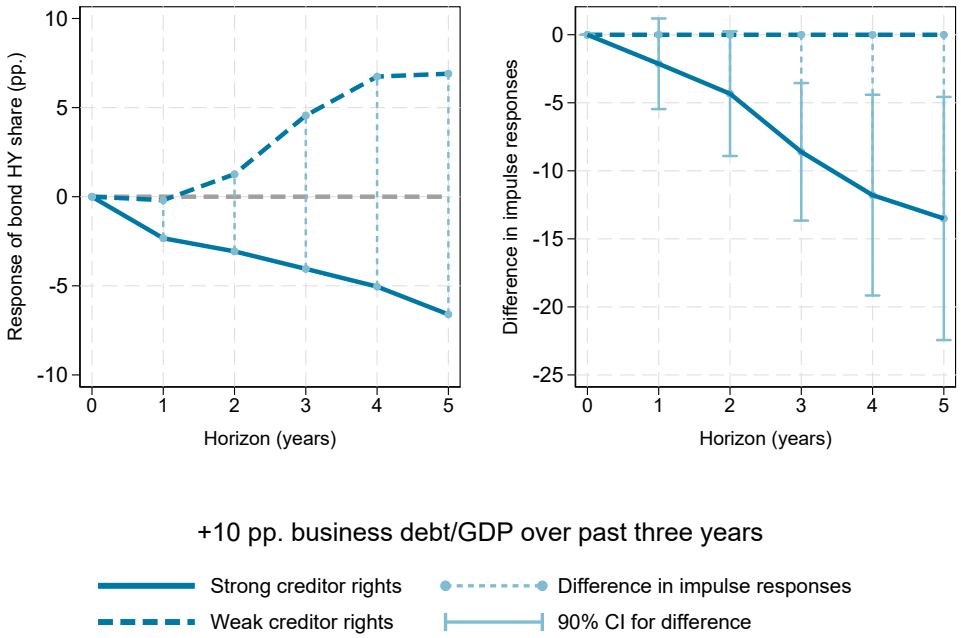
[8] Although our mechanism operates primarily through banks, corporate bond market outcomes remain informative for several reasons. First, in many economies banks are significant holders of corporate bonds, so the same recovery prospects and incentive distortions that affect bank lending can also influence bond pricing and issuance. Second, credit spreads reflect investors' expectations about default resolution, recovery rates, and workout procedures, all of which are directly shaped by creditor rights institutions. Third, weak creditor rights can distort bond market pricing through equilibrium spillovers from the banking sector: when loan forbearance allows financially unviable firms to remain active, market participants may find it difficult to distinguish firms with strong fundamentals from those sustained by continued bank support, even absent the use of proprietary lending information. As a result, credit spreads may fail to fully reflect underlying default risk. Importantly, while many jurisdictions restrict banks from using confidential lending information in securities trading, such firewalls do not prevent these broader spillovers operating through observable defaults, restructurings, and recovery outcomes that shape market-wide beliefs.

Figure 4: Creditor Rights and Credit Reallocation after Booms

(a) Sectoral Credit Reallocation Index



(b) Share of Risky Firm Debt Issuance



Notes: These figure visualizes estimates from local projections using equation (2), where the dependent variable is the Euclidean distance between the sectoral business debt share vectors in $t+h$ and t in Panel (a) and data on the share of newly issued firm debt rated junk collected by Kirti (2025) in Panel (b). We plot the response for a 10 percentage points increase in the business debt-to-GDP ratio over the preceding three years. The left panels plot the impulse response for economies with the strongest creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and for economies with the weakest creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as a dashed line. The right panel plots the difference between those impulse responses ($\hat{\beta}_{2,h} \times 0.1$) with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

credit to more productive uses.

5 Causal Evidence from Legal Reforms across U.S. States

The cross-country panel evidence presented above supports the interpretation that creditor rights matter for the unwinding of credit cycles by protecting bank balance sheets and facilitating a more efficient reallocation of resources. To better understand the potential role of the latter channel—which could be indicative of "zombie lending"—we turn to a natural experiment in the U.S.

Specifically, we turn to firm-level data and and exploit staggered state-level reforms to creditor rights in the U.S. From an identification standpoint, our difference-in-differences analysis has the advantage of holding many factors constant that are hard to control for in a cross-country setting, and thus allows us to credibly estimate causal effects.

5.1 Identification strategy

We exploit variation in creditor rights within the U.S. generated by the staggered state-level adoption of antirecharacterization laws, building on a large literature in corporate finance (e.g., Li et al., 2016; Mann, 2018; Chu, 2020; Ersahin, 2020; Vats, 2020; Favara et al., 2021; Tut, 2021). These laws strengthened secured creditors' ability to access collateral pledged through SPVs in bankruptcy proceedings. Without such laws, judges could *recharacterize* SPV transactions as regular loans, placing the assets under automatic stay and thus blocking creditors from accessing them.[9] This judicial discretion created uncertainty for lenders, reducing their expected recovery rates and discouraging SPV-based lending.

Antirecharacterization laws resolved this uncertainty by guaranteeing creditor access to SPV collateral. Between 1997 and 2005, nine states adopted such statutes.[10] The debt contracts of corporate borrowers became subject to stronger creditor rights once the state of the firm's incorporation adopted antirecharacterization laws.[11]

[9] While the borrower sold assets to the SPV in which the creditor obtained a security interest, judges could reinterpret the sale as a loan, removing the "bankruptcy remote" status of the SPV's assets. As a result, the creditor would gain access to the assets of the bankrupt borrower, rather than only those of the SPV. For background on the use of corporate SPVs and recharacterization inside and outside bankruptcy, see Feng et al. (2009), Gorton and Souleles (2007), and Kettering (2008). Notably, Feng et al. (2009) report that 59% of publicly-listed firms used at least one SPV in 2004.

[10] Texas and Louisiana introduced them in 1997, followed by Alabama and Ohio in 2001, Delaware and North Carolina in 2002, South Dakota in 2003, Virginia in 2004, and Nevada in 2005.

[11] For SPV-based borrowing, a firm sponsors a SPV that issues asset-backed securities to purchase designated col-

In 2003, the landmark case *Reaves Brokerage Company, Inc. v. Sunbelt Fruit & Vegetable Company, Inc.* overturned the enforceability of Texas's statute, establishing federal preemption. This heavily cited precedent created substantial uncertainty surrounding the power of state-level antirecharacterization statutes, and thus partly reversed the strengthening of creditor rights they had created (Li et al., 2016).[12] Following standard practice in the literature, we treat a firm as exposed to strong creditor rights once its state adopts an antirecharacterization law, but consider all states as untreated from the start of 2003 onward to reflect the preemptive effect of the Texas case.[13]

5.2 Event Study: Delaware Reform After the Dotcom Boom

We first focus on Delaware's adoption of antirecharacterization laws in January 2002, immediately after the collapse of the *Dotcom* bubble. This episode involved not only a stock market bubble but also a sizable credit expansion: from 1996 to 2000, the U.S. corporate debt-to-GDP ratio increased by five percentage points—the same magnitude as during the four years leading up to the Great Financial Crisis. Importantly, Delaware's reform did not arise as a discretionary response to the bursting of the Dotcom bubble or to contemporaneous economic

lateral from the firm. The SPV assumes debt and provides cash to the sponsor, and may also acquire new assets that are then leased to the sponsoring firm. SPVs are typically consolidated into the sponsor's financial statements if the sponsor retains an equity stake or other control rights. Establishing *bankruptcy remoteness* requires a transaction to qualify legally as a "true sale". In such cases, both the collateral and the associated debt may be treated as fully off-balance sheet. However, accounting standards often look beyond legal form to assess control and risk. As a result, the firm may still be required to report the collateral, fully or partially, on its balance sheet. Specifically, if the sponsor retains at least 50% of the SPV's equity, consolidation is required. Following the introduction of FIN 46, even smaller equity stakes or non-equity interests such as guarantees may trigger consolidation. In 2009, FIN 46 and its revision, FIN 46(R), were codified into U.S. GAAP as ASC 810. See Li et al. (2016) for details.

[12] In response to the Enron scandal, the U.S. Financial Accounting Standards Board (FASB) issued a new interpretation of the Accounting Research Bulletin No. 51 "Consolidated Financial Statements" on January 17, 2003. This guidance tightened the disclosure and consolidation requirements for SPVs and other variable interest entities (VIEs). VIEs allowed Enron to hide substantial liabilities that contributed to the company's collapse and the eosion of shareholder value. Prior to the introduction of FIN 46, VIEs were not required to be disclosed or consolidated unless the sponsoring firm held at least a 50% voting interest. FIN 46 significantly tightened these requirements by mandating consolidation whenever the sponsor was deemed the *primary beneficiary*, defined as follows (FASB's Summary of Interpretation No. 46): "The primary beneficiary of a variable interest entity is the party that absorbs a majority of the entity's expected losses, receives a majority of its expected residual returns, or both, as a result of holding variable interests, which are the ownership, contractual, or other pecuniary interests in an entity." FIN 46 was further clarified on December 13, 2003, through the issuance of FIN 46(R). Notably, FIN 46(R) specified that the updated accounting rules would apply only to VIEs established after December 31, 2003.

[13] The timing of the Texas ruling was plausibly exogenous to economic conditions (Li et al., 2016). By contrast, the adoption of antirecharacterization laws was influenced by lobbying by securitization firms and banks (Kettering, 2008), potentially making adoption endogenous to credit conditions. Our empirical design therefore includes controls for credit conditions.

conditions. Instead, it reflected long-standing legal debates within Delaware over recharacterization risk and bankruptcy remoteness in structured finance transactions.[14]

Importantly, Delaware's reform occurred at the *end* of the credit expansion. Hence, Delaware firms were exposed to the credit boom under similar creditor rights as firms in states that never adopted antirecharacterization laws. Any differences in firm outcomes after January 2002 thus cannot be attributed to the impact of creditor rights on the nature of the boom, but rather reflect differential responses during the downturn. This mirrors our cross-country results showing that creditor rights matter most during downturns rather than during expansions (Appendix Figure A.3).

For the purpose of this exercise, the treatment group consists of firms incorporated in Delaware, while the control group consists of firms in states that either never adopted antirecharacterization laws or did so only after 2003.[15]

Theoretical Predictions Our cross-country evidence suggests that stronger creditor rights facilitate credit reallocation away from unviable borrowers during the downturn phase of credit cycles. To test this mechanism directly, we focus on financially distressed firms—those most likely to face pressure from creditors in bankruptcy. If the reallocation channel is operational, we should observe changes in lending patterns to risky firms following the reform.

However, theory makes ambiguous predictions about the direction of this effect. Stronger creditor rights could affect credit to distressed firms through two competing channels. On one hand, by increasing expected recovery rates, stronger rights reduce the cost of default for lenders. This could *increase* lending to risky but viable firms by mitigating moral hazard concerns. That is, lenders may be more willing to finance risky projects if they know they can recover more in the event of failure. On the other hand, stronger creditor rights make bankruptcy a more credible threat, which could *reduce* lending to unviable firms by limiting banks' incentives to "evergreen" loans and avoid recognizing losses.

Which effect dominates likely depends on borrowers' investment opportunities. For dis-

[14]Concerns about the treatment of special purpose vehicles and "true sale" doctrine had been actively discussed in Delaware legal circles throughout the 1990s, including in reports by the Delaware State Bar Association and in contemporaneous legal scholarship analyzing Delaware case law (**?**Schwarcz, 1997; Delaware State Bar Association, 1999). These discussions predated the Dotcom boom and were closely tied to Delaware's incentives as a leading incorporation jurisdiction to provide legal certainty and maintain its competitive position (Kahan and Kamar, 2002). The timing of the reform is therefore plausibly orthogonal to firm-level credit conditions or expected post-boom outcomes.

[15]Roughly half of all U.S. public firms are incorporated in Delaware, ensuring sufficient statistical power. The states which adopted these laws earlier—Alabama, Louisiana, North Carolina, Ohio, South Dakota, and Texas—are excluded from the control group.

tressed firms with strong growth prospects, the mitigation of moral hazard should dominate: stronger creditor rights increases credit supply because lenders can finance risky but productive ventures, knowing they will recover more if projects fail. For distressed firms with weak growth prospects, however, the disciplining effect should dominate: stronger creditor rights reduce credit by making it harder for banks to justify continued lending to firms with little chance of recovery. Put differently, stronger creditor rights should enable a more efficient allocation of credit among distressed borrowers, increasing lending to those with genuine investment opportunities while cutting off "zombie" firms that are being kept alive.

This heterogeneity is precisely what our cross-country evidence suggests: credit reallocation away from risky borrowers in countries with strong creditor rights. To test whether this pattern operates through differences in investment opportunities, we split risky firms based on Tobin's Q, a standard measure of growth prospects. We also examine safe firms as a placebo group—since these firms are unlikely to face bankruptcy, changes in creditor rights should have minimal impact on their borrowing.

Empirical Strategy To implement this test, we estimate local projection event studies (Dube et al., 2025) relating firms' cumulative real long-term debt growth over quarterly horizons $h \in \{-8, -7, ..., 8\}$ around the first quarter of 2002:

$$\Delta_h \log(\text{debt}_{f,2001q4+h}) = \beta_h \mathbb{1}(\text{Delaware})_f + \gamma_h \boldsymbol{x}_{f,2001q4} + \epsilon_{f,2001q4+h} \tag{3}$$

The binary variable $\mathbb{1}(\text{Delaware})_f$ indicates which firms, indexed by f, are incorporated in Delaware. The coefficient of interest, β_h, captures the differential debt growth of Delaware firms, conditional on firm characteristics $\boldsymbol{x}_{f,2001q4}$ at the end of 2001, including 2-digit SIC industry fixed effects, debt to asset ratio, liquid assets to total asset ratio, real annual sales growth, Tobin's Q, and rating fixed effects.

We estimate this specification separately for four mutually exclusive subsamples defined by firm risk and firm quality: (i) risky and low quality, (ii) risky and high quality, (iii) safe and low quality, and (iv) safe and high quality. Risky is defined as a credit rating falling into the weakest tercile of the sample distribution (rating below BB-). Low quality firms are defined to have Tobin's Q falling into the weakest tercile of the sample distribution (adjusted Q below 1.39).

We measure Tobin's Q as the ratio of the firm's market value to the book value of assets.

$$Q_{f,q} = \frac{\text{book value of debt}_{f,q} + \text{market value of equity}_{f,q}}{\text{book value of assets}_{f,q}}. \tag{4}$$

Tobin's Q is constructed using Compustat financial statement and stock market data. Comparing Q across industries is problematic because the use of different technologies mean they use assets of varying degrees of tangibility. Moreover, aggregate shifts in market valuations over time could have a confounding effect. To address these concerns, we purge $Q_{f,q}$ of 2-digit SIC industry–quarter fixed effects. This adjustment helps ensure that our measure of firm quality reflects relative differences within an industry and quarter.

Figure 5 presents the trajectory of debt issuance among "treated" and "control" firms before and after Delaware's reform, where we distinguish between risky and safe firms with low and high Tobin's Q. The evidence highlights a clear divergence following the reform: risky, low-Q firms in Delaware saw a sharp decrease in debt growth relative to risky, low-Q firms in the control states. Importantly, we find no such differences for risky high-Q firms, safe low-Q firms, or safe high-Q firms. If anything, "treated" risky high-Q firms experience modest increases in debt growth.

This pattern provides direct causal evidence for the credit reallocation mechanism highlighted in our cross-country analysis. Stronger creditor rights facilitate the withdrawal of credit from distressed firms with poor investment prospects, precisely the type of reallocation that should improve aggregate productivity and reduce the persistence of zombie firms. Moreover, because the reform occurred after the boom, these results rule out alternative explanations based on differences in the type of credit boom.

Addressing Delaware-Specific Effects Delaware plays a prominent role in U.S. corporate governance. A potential concern is that factors specific to Delaware-incorporated firms other than antirecharacterization laws could confound our results. To mitigate this concern, we exploit variation across firms *within* Delaware depending on whether they rely on SPV subsidiaries. This test is motivated by the fact that antirecharacterization laws are designed to strengthen creditor rights specifically in SPV-based transactions.

Because the use of SPVs is not directly observable, we follow the approach of Feng et al. (2009) to proxy for their presence using the type of incorporation. Specifically, we manually examine the Exhibit 21 filings of public U.S. firms from 2001, submitted as part of their 10-K filing with the Securities and Exchange Commission. In these filings, we count the number

of subsidiaries organized as limited liability companies or partnerships, which are the most common legal forms for SPVs.

Appendix Figure A.15 confirms that, within Delaware, the effects we documented are driven by SPV-heavy firms. Thus, our findings indicate that the reallocation of credit away from risky firms with poor growth prospects is driven by the change in SPV-specific legislation rather than other Delaware-specific factors.

5.3 Pooled Reform Estimates

To move beyond the Delaware case study and capture the broader impact of creditor rights reforms, we pool all state-level reforms into a difference-in-differences panel regression framework. This approach leverages both cross-sectional and time-series variation to estimate how changes in statutory creditor protections affect firm borrowing across different states and periods.

Specifically, we estimate

$$\Delta \log(\text{debt}_{f,q}) = \gamma_f + \tau_t + \beta_{R(f,q-1),Q(f,q-1),L(f,q-1)} + \epsilon_{f,q} \tag{5}$$

where $\Delta \log(\text{debt}_{f,q})$ is the real growth rate of a firm's long-term debt between quarters $q-1$ and q. The coefficients of interest, $\beta_{\cdot}$ are indexed by three dimensions: firm risk $R(\cdot)$, indicating risky versus safe firms; investment opportunities $Q(\cdot)$, captured by terciles of Tobin's Q; and creditor rights $L(\cdot)$, which reflects whether the firm operates under stronger statutory protections vis-a-vis a antirecharacterization laws. We lag both R and Q by one quarter to avoid any mechanical correlation, for instance in cases where a sudden increase in debt directly affects a firm's risk rating or perceived investment opportunities. Similarly, creditor rights exposure is measured using the legal status in the prior quarter, ensuring that treatment precedes observed borrowing outcomes.

The specification includes firm fixed effects (γ_f) to absorb time-invariant heterogeneity across firms and quarter fixed effects (τ_t) to control for aggregate shocks to credit markets. This framework allows us to trace how debt growth varies jointly with firm risk, investment quality, and the legal environment governing creditor rights.

Figure 6 presents the panel regression results visualized across different firm types, which reveals stark differences in how antirecharacterization laws affect credit allocation depending on firm risk and investment opportunities. The estimates closely align with the event study.

Among risky firms, firms with low Tobin's Q (bottom tercile) experience substantial reductions in debt growth of more than 10 percentage points, while firms with high Q (top tercile) see modest increases of roughly 5-10 percentage points. This reallocation pattern is absent among safe firms, where debt growth remains essentially unchanged across all investment opportunity levels regardless of the strength of creditor rights. These findings are consistent with the interpretation that stronger creditors rights cause a reallocation of credit away from firms with weaker investment opportunities to firms with stronger investment opportunities.

We repeat the analysis for sales growth to test for corresponding real effects. The estimates are visualized in Appendix Figure A.14. In line with the pattern observed for debt growth, we find that risky Delaware firms with poor (strong) growth potential see a decline (increase) in sales after the reform compared to risky firms with poor (strong) growth potential elsewhere.

Table 2 confirms these results across alternative specifications, adding controls and varying fixed effects to the panel regression of Equation (5). Across all models, the negative effect for risky firms with low Tobin's Q proves highly robust, consistently indicating a sharp contraction in debt growth once stronger creditor rights are in place. The positive effect for risky, high-Q firms is less consistent, suggesting that stronger creditor rights matter particularly for debt issuance of underperforming firms.

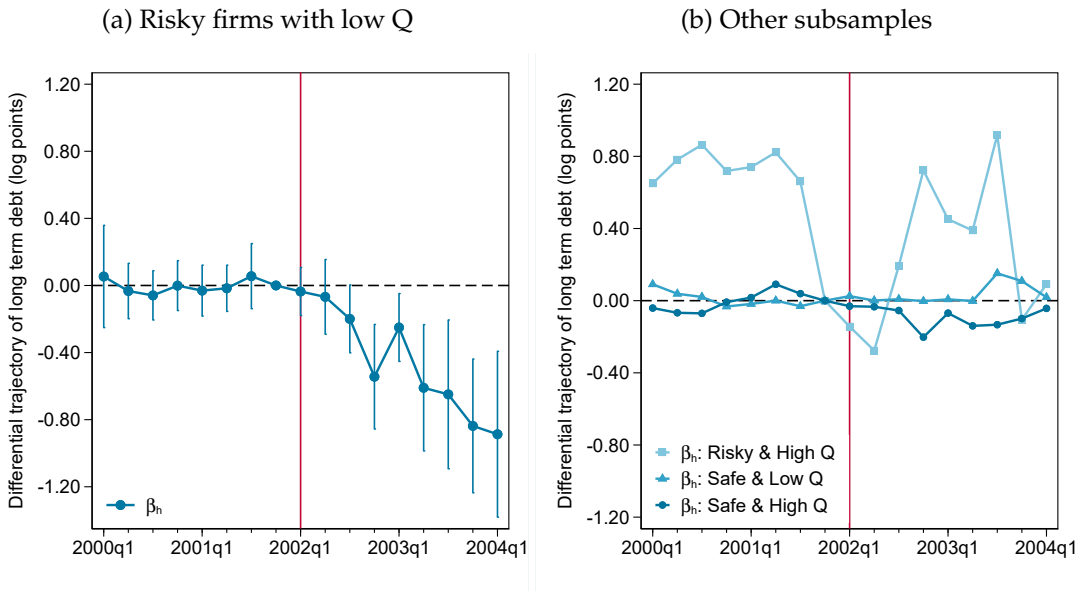
Appendix Table A.3 presents estimates from alternative specifications that vary measures of firm risk (Z-score instead of rating), sample composition (excluding Delaware), and the dependent variables (capital expenditure instead of debt). Our conclusions remain robust across all specifications, suggesting that stronger creditor rights are systematically associated with an improved allocation of credit and capital by reducing lending to distressed firms with poor investment prospects.

5.4 Linking Micro and Macro Evidence

Our firm-level estimates provide causal evidence for a key mechanism underlying our cross-country results. Stronger creditor rights are systematically linked to a reallocation of credit away from financially distressed firms with poor investment opportunities and toward those with better prospects. This shift is consistent with an improvement in the efficiency of credit allocation, which could translate into higher future productivity. This mechanism helps explain why strong creditor rights mitigate the consequences of credit booms. Specifically, following credit booms, countries with stronger creditor rights experience smaller output losses, more efficient credit reallocation away from risky borrowers and across sectors, and lower

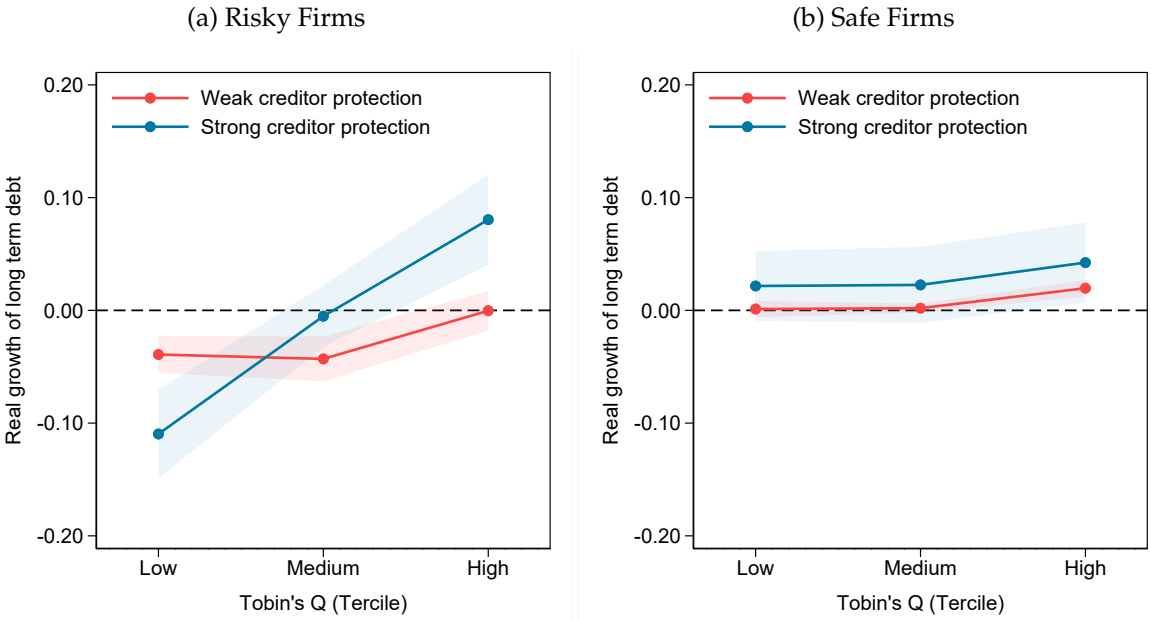
non-performing loan ratios. When credit flows away from unviable firms and toward productive uses, the economy can adjust more efficiently and avoid unnecessary additional defaults. Conversely, under weak creditor rights, banks remain locked into lending relationships with low-quality, risky borrowers, which could give rise to "zombie lending" and delay necessary restructuring. The result could be an economy trapped into a low-productivity equilibrium characterized by misallocation, amplifying balance sheet deterioration and slowing the recovery.

Figure 5: Creditor Rights and Credit Allocation After the Dotcom Boom



Notes: The figure plots estimates of coefficient β_h from Equation (3) for different subsamples. The left panel plots point estimates and 95% confidence intervals for firms that are financially distressed and of low quality, i.e., those with a credit rating and Tobin's Q both falling within the lowest tercile of the sample distribution. The right panel plots point estimates for firms that are financially distressed and of high quality ("Risky & High Q"), firms that are financially solid and of low quality ("Safe & Low Q"), as well as firms that are financially solid and of high quality ("Safe & High Q").

Figure 6: Antirecharacterization Laws and Debt Growth Across Firms



Notes: This figure visualizes estimates for $\beta_{R(f,q-1),Q(f,q-1),L(f,q-1)}$ from Equation (5). The left panel shows point estimates of future debt growth for risky firms ($R(f,q-1)=1$). The right panel shows point estimates of future debt growth for safe firms ($R(f,q-1)=0$). Shaded areas mark 95% confidence intervals based on standard errors clustered at the level of U.S. states.

Table 2: Antirecharacterization Laws and Debt Growth Across Firms, Various Specifications

	(1)	(2)	(3)	(4)	(5)	(6)
Low Q × High risk × Strong creditors	-0.116***	-0.140***	-0.151***	-0.157***	-0.138***	-0.165***
	(0.026)	(0.020)	(0.025)	(0.020)	(0.021)	(0.028)
Low Q × High risk	-0.001	0.005	0.010	0.023*	0.004	0.025**
	(0.010)	(0.010)	(0.010)	(0.013)	(0.010)	(0.012)
Low Q × Strong creditors	-0.001	0.006	0.012***	0.009	0.039*	0.053*
	(0.004)	(0.006)	(0.003)	(0.006)	(0.021)	(0.029)
High risk × Strong creditors	0.025**	0.078***	0.083***	0.114***	0.079***	0.081**
	(0.012)	(0.015)	(0.013)	(0.038)	(0.014)	(0.039)
Low Q	-0.003	0.002	0.001	-0.003		
	(0.004)	(0.005)	(0.004)	(0.006)		
High risk	-0.038***	-0.034***	-0.038***		-0.034***	
	(0.009)	(0.010)	(0.013)		(0.010)	
Strong creditors	0.022	0.011		0.002	-0.002	
	(0.018)	(0.020)		(0.022)	(0.018)	
Firm Controls		✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Quarter FE	✓	✓	✓	✓	✓	✓
Quarter × State FE			✓			✓
Quarter × High Risk FE				✓		✓
Quarter × Low Q FE					✓	✓
# of Obs.	36,456	31,453	31,131	31,453	31,453	31,131
R^2	0.06	0.08	0.11	0.08	0.08	0.12

Notes: This table present estimates from regressions following Equation (5) adding firm controls and fixed effects. Column (1) presents the baseline. Column (2) adds the log real total assets and the firm's liquidity ratio as controls. Column (3) adds quarter-state fixed effects. Column (4) adds quarter-specific fixed effects for firms rated below BB-. Column (5) adds quarter-specific fixed effects for firms with Tobin's Q in the lowest tercile. Column (6) shows the full specification. Standard errors are shown in parentheses and clustered at the level of U.S. states. $***p < 0.01$, $**$, $p < 0.05$, $*$, $p < 0.10$.

6 Creditor Rights and the Incidence of Credit Booms

Do creditor rights only matter for how credit booms play out, or also for the likelihood of booms to begin with? We investigate this question in three steps. Section 6.1 studies the frequency and magnitude of booms. Section 6.2 provides evidence on the response of credit to productivity shocks. Section 6.3 examines other characteristics of credit expansions across creditor rights regimes, including risk-taking and bankruptcy resolution.

Our findings reveal a trade-off. Countries with strong creditor rights experience more frequent and larger credit booms, consistent with expanded credit supply from higher recovery rates. However, these booms differ fundamentally in nature: credit markets respond more strongly to productivity shocks, and bankruptcies are resolved earlier in the cycle rather than being delayed until the bust. In contrast, while countries with weak creditor rights experience fewer and smaller booms, the aftermath is significantly worse, characterized by limited reallocation, zombie lending, and persistent GDP losses. This suggests that strong creditor rights are associated with more "productive booms" that, despite occurring more frequently, impose substantially lower macroeconomic costs when they unwind.

6.1 Boom Frequency and Magnitude

We begin by examining whether countries with stronger creditor rights experience credit booms more frequently. Figure 7 compares the distribution of three-year changes in business debt-to-GDP ratios across countries with strong versus weak creditor rights. Countries with strong creditor protection exhibit a slightly higher frequency of extreme credit expansions, with the right tail extending further than in weak creditor rights regimes.

Beyond frequency, we examine whether the magnitude of credit booms differs systematically across legal regimes. To examine the role of creditor rights on boom size while controlling for past macro-financial dynamics, we estimate state-dependent local projections for $h \in \{1, 2, ..., 6\}$:

$$\begin{aligned}\Delta_h c_{i,t+h} = \alpha_{i,h} + \beta_{1,h} \mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \\ + \beta_{2,h} \Big(\mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \times L_{i,t} \Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t}\end{aligned} \tag{6}$$

where $c_{i,t}$ is the business debt-to-GDP in country i and year t and $L_{i,t}$ is the composite creditor rights index defined in Equation (3.1). The vector of controls $\boldsymbol{x}$ includes the contemporaneous

Table 3: Macroeconomic Patterns During Business Credit Booms, by Legal Regime

		Creditor Rights		
	N	Weak	Strong	Difference p-value
Business Debt/GDP	805	0.124	0.173	0.288
Log Real Business Debt	781	0.134	0.240	0.026
Log Real GDP	781	-0.047	0.006	0.121
Log CPI	781	-0.023	0.024	0.133
Investment/GDP	805	-0.687	-0.112	0.575
Log Real Household Debt	781	0.007	0.084	0.325
Share of Debt in Nontradable Sectors	470	0.009	0.016	0.575
Corporate Credit Spread	421	0.524	0.473	0.898
Risky Corporate Credit (Kirti, 2025)	583	-4.604	0.078	0.523
Nonperforming Loan Ratio	513	-1.445	1.684	0.194

Notes: This table compares the change in macroeconomic variables during business credit booms across legal regimes. Each row presents coefficient estimates from the following panel regression: $\Delta_3 y_{i,t} = \gamma_i + \beta_1 \mathbb{1}(\Delta_3 c_{i,t} \geq 0.05) + \beta_2 \Big(1(\Delta_3 c_{i,t} \geq 0.05) \times L_{i,t}\Big) + \beta_3 L_{i,t} + e_{i,t}$ where $y_{i,y}$ is the variable listed in the first column for country i at year t, γ_i represents country fixed effects, $c_{i,t}$ is the business debt-to-GDP ratio and $L_{i,t}$ is the creditor rights index defined in Equation (3.1). The second column lists the sample size. The third column shows $\hat{\beta}_1$, i.e., the change in the dependent variable over the past three years if the business debt-to-GDP ratio increased by at least 5 percentage points over the same period. The fourth column shows the sum $\hat{\beta}_1 + \hat{\beta}_2$, i.e., the change in the dependent variable over the past three years if the business debt-to-GDP ratio increased by at least 5 percentage points over the same period and the creditor rights index falls into its top percentile. The fifth column shows the p-value for the t-test on the interaction coefficient $\hat{\beta}_2$ based on standard errors clustered at the country level.

value and five lags of annual real GDP growth, as well as the current and lagged changes in the business and household debt-to-GDP ratios.

Figure 8a shows that credit booms are substantially larger under strong creditor rights regimes. Under strong creditor protection, business debt-to-GDP rises by approximately 18 percentage points over six years following the initiation of a credit boom, compared to only 9 percentage points in weak creditor rights countries. The difference between regimes grows over time, reaching a peak differential of about 10 percentage points by year 6.

This pattern suggests that creditor rights are associated with both a higher frequency and amplitude of credit booms, yet predict relatively softer landings when these booms unwind. This finding is consistent with theoretical models where enhanced creditor protection increases banks' willingness to lend by improving expected recovery rates.

6.2 Responsiveness to Productivity Shocks

To better understand the mechanisms behind these boom patterns, we examine how credit responds to productivity improvements across different creditor rights regimes. When productivity rises, demand for investment financing should increase. Whether this translates into actual credit growth depends on the financial system's ability to fund productive opportunities. Given the critical role of credit reallocation in our results above, we ask whether the elasticity of credit to productivity shocks also hinges on the strength of creditor protections.

We estimate impulse responses to total factor productivity shocks using local projections for $h \in \{1, 2, ..., 5\}$:

$$\Delta_h c_{i,t-1+h} = \alpha_{i,h} + \beta_{1,h}\Delta A_{i,t} + \beta_{2,h}\Big(\Delta A_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{7}$$

where $c_{i,t}$ is the business debt-to-GDP in country i and year t, $A_{i,t}$ is the natural logarithm of aggregate total factor productivity and $L_{i,t}$ is the composite creditor rights index defined in Equation (3.1). The vector of controls $\boldsymbol{x}$ includes five lags of annual TFP growth, real GDP growth, and changes in business and household debt-to-GDP ratios.

Figure 8b shows a clear divergence in credit responses to productivity innovations. A 5 percentage point time series innovation in TFP predicts a larger credit expansion in strong creditor rights countries, with business debt-to-GDP rising by approximately 4-5 percentage points over the 5-year horizon. In contrast, weak creditor rights countries experience a decline in credit of about 3 percentage points following a productivity shock of the same magnitude. The differential response between regimes peaks around year 3 at approximately 8 percentage points and is statistically significant.

These patterns are suggestive of a beneficial role of strong creditor rights in the allocation of credit in the economy. When productive opportunities arise, credit flows more readily to them under strong creditor protection, as creditors' ability to enforce claims and recover value in case of default may encourage the financing of productivity-enhancing but risky investments. Weak creditor rights, however, may constrain growth in credit if banks facing poor recovery prospects may become overly conservative. As such, weak creditor protection can be a form of financial friction that prevents an efficient allocation of capital, and thus potentially play a role in hindering economic growth even during periods of technological progress.

6.3 Characteristics of Credit Booms

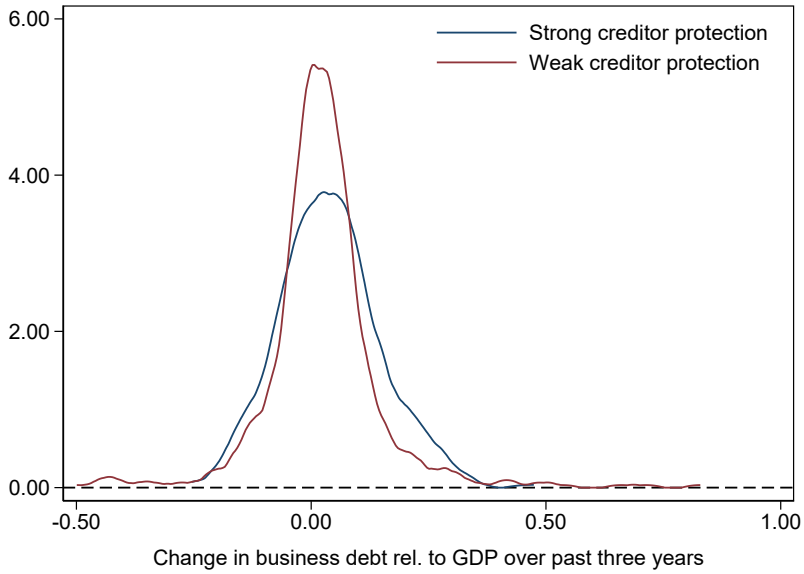
Does the nature of credit booms differ across creditor rights regimes? Table 3 documents systematic differences during credit booms across legal regimes. Credit booms under strong creditor rights are associated with substantially higher GDP growth (3.1 versus 1.8 percentage points) and investment rates. They also exhibit greater high-yield bond issuance and higher bankruptcy rates, suggesting more risk-taking combined with an earlier resolution of distress. These patterns indicate that the institutional environment shapes not only the aftermath of credit booms but also their underlying characteristics.

Appendix Figure A.13 explores the dynamics of these patterns. Panel A.13a shows that the increase in high-yield bond issuance builds gradually during boom periods under strong creditor rights, indicating sustained risk-taking. This finding is consistent with strong creditor rights increasing credit supply to riskier borrowers. When creditors have strong enforcement capabilities, they may be more willing to finance risky but potentially productive ventures, knowing they can recover value if projects fail.

Panel A.13b plots the impulse response of bankruptcy filings during a credit boom. Where creditor protections are strong, countries experience increases in bankruptcy filings during boom periods rather than the bust phase. This pattern suggests that stronger creditor protection facilitates early identification and resolution of failing projects, preventing the accumulation of "zombie firms" that could amplify future downturns. The ability to cut losses quickly during booms may be one reason why strong creditor rights countries experience less severe post-boom adjustments.

Taken together, the findings in this section can be summarized as follows. Credit booms are more frequent and accompanied with greater risk-taking where creditors are strong. However, they are also more likely to reflect productivity accelerations and are associated with an earlier resolution of distress. As such, stronger creditor rights are associated with a higher likelihood of "good booms" (Gorton and Ordoñez, 2020) with a more efficient reallocation of resources.

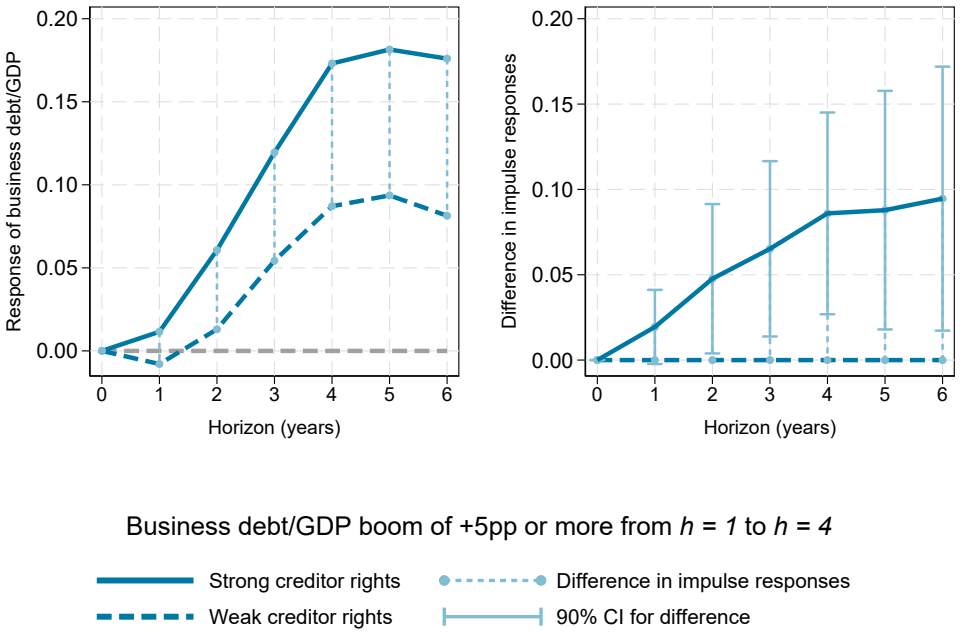
Figure 7: Credit Cyclicality and Creditor Rights



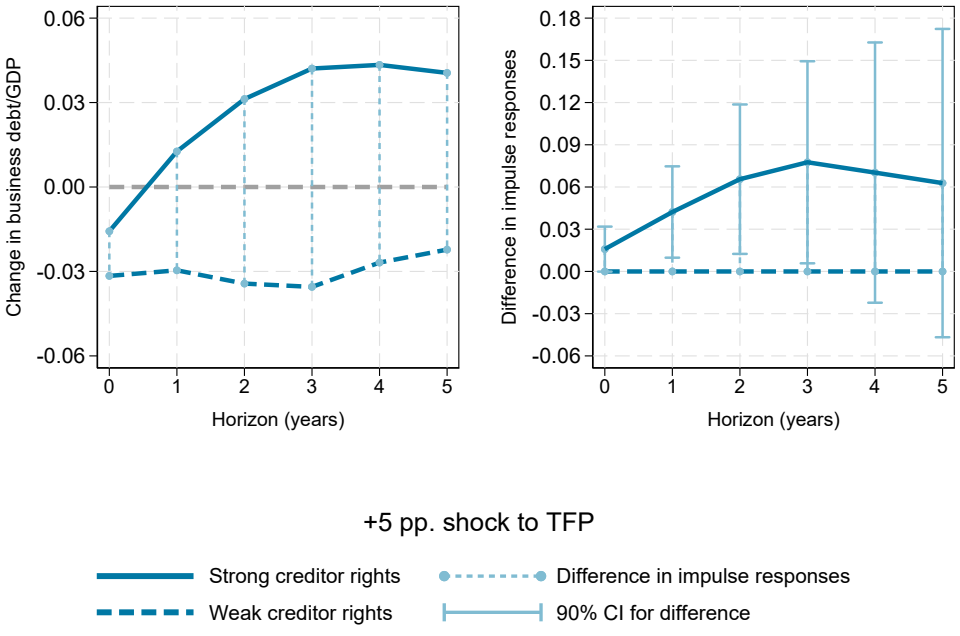
Notes: This figure shows the kernel density plot for the three year change in the business debt-to-GDP ratio in the country-year sample with strong (weak) creditor rights, $L_{i,t} = 1$ ($L_{i,t} = 0$).

Figure 8: Creditor Rights, Credit Booms, and Productivity

(a) Magnitude of Credit Expansion



(b) TFP Shocks and Credit Booms



Notes: These figures visualize estimates from local projections as in equation (6). Panel (a) plots the estimated dynamic response of business credit-to-GDP to a boom, defined as an increase in the ratio of 5 percentage points or more. Panel (b) plots the estimated response of business credit-to-GDP to a 5 percentage points increase in total factor productivity. We differentiate between strong creditor rights ($\hat{\beta}_{1,h} + \hat{\beta}_{2,h}$) and weak creditor rights ($\hat{\beta}_{1,h}$) in the left panel. The right panel plots the difference between those impulse responses, $\hat{\beta}_{2,h}$, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

7 Conclusion

Do stronger creditor rights amplify or dampen the macroeconomic risks of credit booms? Using cross-country data covering 39 economies from 1978–2019 and a natural experiment exploiting staggered U.S. state-level legal reforms, we show that creditor rights play a central role in determining whether credit booms end in a *cleansing* period of reallocation or in *sullying* downturns. While business credit booms are common across institutional environments, their macroeconomic aftermath differs sharply. Economies with strong creditor protections experience substantially milder busts, whereas those with weak protections suffer large and persistent output losses. Quantitatively, comparable increases in business leverage predict cumulative GDP losses over five years that are roughly five percentage points larger in weak-creditor regimes.

Our results shed light on why these differences arise. Stronger creditor rights shape both ex-ante behavior during expansions and ex-post adjustment during downturns. By increasing expected recovery values, they discipline borrowing and lending decisions during booms and strengthen intermediary balance sheets once distress materializes. We provide novel evidence that creditor rights govern how credit booms unwind by shaping the reallocation of credit across firms. In weak creditor-rights regimes, poor recovery prospects create incentives for banks to evergreen loans to distressed borrowers, fostering zombie lending relationships that trap capital in low-productivity uses and prolong economic weakness. In contrast, strong creditor rights facilitate timely restructuring and liquidation, allowing resources to be redeployed toward firms with viable growth opportunities. In this sense, downturns in strong-creditor environments are more likely to cleanse the economy, while downturns in weak-creditor environments are more likely to damage it.

These findings also speak to the design of macroprudential policy. A growing literature emphasizes that private agents do not internalize the systemic risks created by leverage during credit booms, motivating ex-ante policy interventions aimed at restricting credit growth. Our evidence highlights an additional, institutional margin: the legal framework governing default and enforcement affects not only the size and frequency of credit booms, but also the severity of the externalities they generate. While stronger creditor rights are associated with more frequent and larger business credit booms – consistent with an expansion in credit supply – they substantially attenuate their macroeconomic costs by enabling faster balance-sheet repair and more efficient capital reallocation. In this sense, creditor rights interact with standard macroprudential tools by shaping the allocative efficiency of post-boom adjustment

rather than merely the quantity of credit.

More broadly, our results emphasize that financial stability depends not only on how much credit is created, but also on how losses are resolved once credit risks materialize. Legal institutions governing creditor–debtor relationships emerge as a first-order determinant of whether economies recover from credit booms through productive reallocation or remain burdened by persistent misallocation and impaired balance sheets. Future research could explore the welfare trade-offs implied by stronger creditor protections, as well as their interaction with regulatory policies designed to limit systemic risk. Taken together, our findings suggest that strengthening creditor rights can make credit cycles less damaging, not by preventing booms altogether, but by improving the efficiency with which economies adjust once credit risks materialize.

References

Acharya, Viral V., and Krishnamurthy V. Subramanian. 2009. "Bankruptcy Codes and Innovation." The Review of Financial Studies, 22: 4949–4988.

Acharya, Viral V., Matteo Crosignani, Tim Eisert, and Christian Eufinger. 2024. "Zombie Credit and (Dis-)Inflation: Evidence from Europe." Journal of Finance, 79(3): 1883–1929.

Acharya, Viral V., Yakov Amihud, and Lubomir Litov. 2011. "Creditor Rights and Corporate Risk-Taking." Journal of Financial Economics, 102(1): 150–166.

Aghion, Philippe, Oliver D. Hart, and John Moore. 1992. "The Economics of Bankruptcy Reform." Journal of Law, Economics, and Organization, 8(3): 523–546.

Antill, Samuel, and Christopher Clayton. 2025. "Crisis Interventions in Corporate Insolvency." Journal of Finance, 80(2): 875–910.

Auclert, Adrien, and Kurt Mitman. 2023. "Consumer Bankruptcy as Aggregate Demand Management." Stanford, mimeo.

Auclert, Adrien, Will S. Dobbie, and Paul Goldsmith-Pinkham. 2019. "Macroeconomic Effects of Debt Relief: Consumer Bankruptcy Protections in the Great Recession." National Bureau of Economic Research, Inc NBER Working Papers 25685.

Bae, Kee-Hong, and Vidhan K. Goyal. 2009. "Creditor Rights, Enforcement, and Bank Loans." Journal of Finance, 64(2): 823–860.

Barlevy, Gadi. 2002. "The sullying effect of recessions." The Review of Economic Studies, 69(1): 65–96.

Baron, Matthew, Emil Verner, and Wei Xiong. 2021. "Banking Crises Without Panics." Quarterly Journal of Economics, 136(1): 51–113.

Becker, Bo, and Victoria Ivashina. 2022. "Weak Corporate Insolvency Rules: The Missing Driver of Zombie Lending." AEA Papers and Proceedings, 112: 516–20.

Benmelech, Efraim, and Nittai Bergman. 2011. "Vintage Capital and Creditor Protection." Journal of Financial Economics, 99(2): 308–332.

Ben Zeev, Nadav, Valerie Ramey, and Sarah Zubairy. 2023. "Do Government Spending Multipliers Depend on the Sign of the Shock?" AEA Papers and Proceedings, 113: 382–87.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist. 1999. "The Financial Accelerator in a Quantitative Business Cycle Framework." In Handbook of Macroeconomics. Vol. 1, , ed. John B. Taylor and Michael Woodford, Chapter 21, 1341–1393. Elsevier.

Bernstein, Shai, Emanuele Colonelli, and Benjamin Iverson. 2019a. "Asset Allocation in Bankruptcy." The Journal of Finance, 74(1): 5–53.

Bernstein, Shai, Emanuele Colonnelli, Xavier Giroud, and Benjamin Iverson. 2019b. "Bankruptcy Spillovers." Journal of Financial Economics, 133(3): 608–633. JFE Special Issue on Labor and Finance.

Bian, Bo. 2020. "Globally Consistent Creditor Protection, Reallocation, and Productivity." Goethe University, Center for Advanced Studies on the Foundations of Law and Finance (LawFin) LawFin Working Paper Series 6.

Bianchi, Javier. 2011. "Overborrowing and systemic externalities in the business cycle." American Economic Review, 101(7): 3400–3426.

Bianchi, Javier, and Enrique G Mendoza. 2018. "Optimal time-consistent macroprudential policy." Journal of Political Economy, 126(2): 588–634.

Borio, Claudio, and Philip Lowe. 2002. "Asset Prices, Financial and Monetary Stability: Exploring the Nexus." BIS Working Papers 114.

Brunnermeier, Markus K., and Yuliy Sannikov. 2014. "A Macroeconomic Model with a Financial Sector." American Economic Review, 104(2): 379–421.

Caballero, Ricardo J., Takeo Hoshi, and Anil K. Kashyap. 2008. "Zombie Lending and Depressed Restructuring in Japan." American Economic Review, 98(5): 1943–77.

Chu, Yongqiang. 2020. "Collateral, Ease of Repossession, and Leases: Evidence From Antirecharacterization Laws." Management Science, 66(7): 2951–2974.

Dagher, Jihad, and Yangfan Sun. 2016. "Borrower Protection and the Supply of Credit: Evidence From Foreclosure Laws." Journal of Financial Economics, 121(1): 195–209.

Davydenko, Sergei A., and Julian R. Franks. 2008. "Do Bankruptcy Codes Matter? A Study of Defaults in France, Germany, and the U.K." Journal of Finance, 63(2): 565–608.

Delaware State Bar Association. 1999. "Proposed Amendments to the Delaware General Corporation Law."

Diamond, Douglas W, and Raghuram G Rajan. 2001. "Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking." Journal of Political Economy, 109(2): 287–327.

Diamond, Douglas W, and Raghuram G Rajan. 2011. "Fear of Fire Sales, Illiquidity Seeking, and Credit Freezes." The Quarterly Journal of Economics, 126(2): 557–591.

Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer. 2007. "Private Credit in 129 Countries." Journal of Financial Economics, 84(2): 299–329.

Djankov, Simeon, Oliver Hart, Caralee McLiesh, and Andrei Shleifer. 2008. "Debt Enforcement Around the World." Journal of Political Economy, 116(6): 1105–1149.

Drozd, Lukasz A, and Ricardo Serrano-Padial. 2018. "Financial Contracting With Enforcement Externalities." Journal of Economic Theory, 178: 153–189.

Dube, Arindrajit, Daniele Girardi, Oscar Jorda, and Alan M Taylor. 2025. "A Local Projections Approach to Difference-in-Differences." Journal of Applied Econometrics.

Ersahin, Nuri. 2020. "Creditor Rights, Technology Adoption, and Productivity: Plant-Level Evidence." The Review of Financial Studies, 33(12): 5784–5820.

Favara, Giovanni, Janet Gao, and Mariassunta Giannetti. 2021. "Uncertainty, Access to Debt, and Firm Precautionary Behavior." Journal of Financial Economics, 141(2): 436–453.

Feng, Mei, Jeffrey Gramlich, and Sanjay Gupta. 2009. "Special Purpose Vehicles: Empirical Evidence on Determinants and Earnings Management." Accounting Review, 84(6): 1833–1876.

Ghent, Andra C., and Marianna Kudlyak. 2011. "Recourse and Residential Mortgage Default: Evidence from U.S. States." The Review of Financial Studies, 24(9): 3139–3186.

Giannetti, Mariassunta, and Andrei Simonov. 2013. "On the Real Effects of Bank Bailouts: Micro Evidence from Japan." American Economic Journal: Macroeconomics, 5(1): 135–167.

Gopinath, Gita, Şebnem Kalemli-Özcan, Loukas Karabarbounis, and Carolina Villegas-Sanchez. 2017. "Capital Allocation and Productivity in South Europe." The Quarterly Journal of Economics, 132(4): 1915–1967.

Gorton, Gary, and Guillermo Ordoñez. 2020. "Good Booms, Bad Booms." Journal of the European Economic Association, 18(2): 618–665.

Gorton, Gary, and Nicholas Souleles. 2007. "Special Purpose Vehicles and Securitization." In The Risks of Financial Institutions. University of Chicago Press.

Gourinchas, Pierre-Olivier, and Maurice Obstfeld. 2012. "Stories of the Twentieth Century for the Twenty-first." American Economic Journal: Macroeconomics, 4(1): 226–65.

Greenwood, Robin, and Samuel G. Hanson. 2013. "Issuer Quality and Corporate Bond Returns." The Review of Financial Studies, 26(6): 1483–1525.

Greenwood, Robin, Samuel Hanson, Andrei Shleifer, and Jakob Sørensen. 2022. "Predictable Financial Crises." Journal of Finance, 77(2): 863–921.

Gurrea-Martinez, Aurelio. 2025. "The Myth of Debtor-Friendly or Creditor-Friendly Insolvency Systems: Evidence From a New Global Insolvency Index." SMU Yong Pung How School of Law Research Paper.

Hart, Oliver, and John Moore. 1998. "Default and Renegotiation: A Dynamic Model of Debt." The Quarterly journal of economics, 113(1): 1–41.

Haselmann, Rainer F. H., Katharina Pistor, and Vikrant Vig. 2010. "How Law Affects Lending." The Review of Financial Studies, 23(2): 549–580.

Heitz, Arie R., and Ganesh E. Narayanamoorthy. 2021. "Creditor Rights and Bank Loan Losses." Journal of Financial and Quantitative Analysis, 56(8): 2803–2841.

He, Zhiguo, and Arvind Krishnamurthy. 2013. "Intermediary Asset Pricing." American Economic Review, 103(2): 732–70.

Holmström, Bengt, and Jean Tirole. 1997. "Financial Intermediation, Loanable Funds, and the Real Sector." the Quarterly Journal of economics, 112(3): 663–691.

Holmström, Bengt, and Jean Tirole. 1998. "Private and Public Supply of Liquidity." Journal of Political Economy, 106(1): 1–40.

Hoshi, Takeo, and Anil K. Kashyap. 2004. "Japan's Financial Crisis and Economic Stagnation." Journal of Economic Perspectives, 18(1): 3–26.

Houston, Joel F., Chen Lin, Ping Lin, and Yue Ma. 2010. "Creditor Rights, Information Sharing, and Bank Risk Taking." Journal of Financial Economics, 96(3): 485–512.

Ivashina, Victoria, Şebnem Kalemli-Özcan, Luc Laeven, and Karsten Müller. 2024. "Corporate Debt, Boom-Bust Cycles, and Financial Crises." National Bureau of Economic Research, Inc NBER Working Papers 32225.

Jordà, Òscar, Martin Kornejew, Moritz Schularick, and Alan M Taylor. 2022. "Zombies at Large? Corporate Debt Overhang and the Macroeconomy." The Review of Financial Studies, 35(10): 4561–4586.

Kahan, Marcel, and Ehud Kamar. 2002. "The myth of state competition in corporate law." Stan. L. Rev., 55: 679.

Kettering, Kenneth. 2008. "True Sales of Receivables: A Purpose Analysis." American Bankruptcy Institute Law Review, 16: 511–562.

Kindleberger, Charles P. 1978. "Manias, Panics and Crashes, Londres et Basingstoke."

Kirti, Divya. 2025. "Lending Standards and Output Growth." Journal of Financial Stability, 76: 101351.

Kiyotaki, Nobuhiro, and John Moore. 1997. "Credit Cycles." Journal of Political Economy, 105(2): 211–248.

Korinek, Anton, and Alp Simsek. 2016. "Liquidity trap and excessive leverage." American Economic Review, 106(3): 699–738.

Kornejew, Martin. 2025. "Market Creditor Protection, Finance and Investment." Mimeo.

Kornejew, Martin, Chen Lian, Yueran Ma, Pablo Ottonello, and Diego Perez. 2024. "Bankruptcy Resolution and Credit Cycles." In NBER Macroeconomics Annual 2024, volume 39. , ed. John Leahy, Martin Eichenbaum and Valerie Ramey. University of Chicago Press.

Krishnamurthy, Arvind, and Todd Muir. 2017. "Credit Spreads and Business Cycle Fluctuations." Journal of Political Economy, 125(3): 715–770.

Kundu, Shohini. 2021. "Covenant-driven fire sales."

La Porta, Rafael, Florencio Lopez-de Silanes, Andrei Shleifer, and Robert W. Vishny. 1998. "Law and Finance." Journal of Political Economy, 106(6): 1113–1155.

Li, Shaojin, Toni Whited, and Yufeng Wu. 2016. "Collateral, Taxes, and Leverage." The Review of Financial Studies, 29(6): 1453–1500.

Mann, William. 2018. "Creditor Rights and Innovation: Evidence from Patent Collateral." Journal of Financial Economics, 130(1): 25–47.

Mian, Atif, Amir Sufi, and Erik Verner. 2017. "Household Debt and Business Cycles Worldwide." The Quarterly Journal of Economics, 132(4): 1755–1817.

Mian, Atif, Amir Sufi, and Francesco Trebbi. 2015. "Foreclosures, House Prices, and the Real Economy." Journal of Finance, 70(6): 2587–2634.

Midrigan, Virgiliu, and Daniel Yi Xu. 2014. "Finance and Misallocation: Evidence From Plant-Level Data." American economic review, 104(2): 422–458.

Minsky, Hyman P. 1977. "The Financial Instability Hypothesis: An Interpretation of Keynes and an Alternative to "Standard" Theory." Challenge, 20(1): 20–27.

Müller, Karsten, and Emil Verner. 2023. "Credit Allocation and Macroeconomic Fluctuations." Review of Economic Studies, rdad112.

Peek, Joe, and Eric S. Rosengren. 2005. "Unnatural Selection: Perverse Incentives and the Misallocation of Credit in Japan." American Economic Review, 95(4): 1144–1166.

Pence, Karen M. 2006. "Foreclosing on Opportunity: State Laws and Mortgage Credit." Review of Economics and Statistics, 88(1): 177–182.

Qian, Jun, and Philip E. Strahan. 2007. "How Laws and Institutions Shape Financial Contracts: The Case of Bank Loans." Journal of Finance, 62(6): 2803–2834.

Reinhart, Carmen M, and Kenneth S Rogoff. 2011. "From Financial Crash to Debt Crisis." American economic review, 101(5): 1676–1706.

Rodano, Giacomo, Nicolas Serrano-Velarde, and Emanuele Tarantino. 2016. "Bankruptcy Law and Bank Financing." Journal of Financial Economics, 120(2): 363–382.

Schivardi, Fabiano, Enrico Sette, and Guido Tabellini. 2021. "Credit Misallocation During the European Financial Crisis." The Economic Journal, 132(641): 391–423.

Schularick, Moritz, and Alan M Taylor. 2012. "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008." American Economic Review, 102(2): 1029–1061.

Schwarcz, Steven L. 1997. "The Universal Language of Cross-Border Finance." Duke J. Comp. & Int'l L., 8: 235.

Shleifer, Andrei, and Robert W Vishny. 1992. "Liquidation Values and Debt Capacity: A Market Equilibrium Approach." The journal of finance, 47(4): 1343–1366.

Tantri, Prasanna. 2020. "Creditors' Rights and Strategic Default: Evidence from India." The Journal of Law and Economics, 63(3): 411–447.

Tut, Daniel. 2021. "Creditor Rights, Debt Capacity and Securities Issuance: Evidence From Anti-Recharacterization Laws." Toronto State University mimeo.

Vats, Nishant. 2020. "Financial Constraints and the Transmission of Monetary Policy: Evidence From Relaxation of Collateral Constraints." Olin Business School Center for Finance & Accounting Research Paper, , (2023/19).

Vig, Vikrant. 2013. "Access to Collateral and Corporate Debt Structure: Evidence From a Natural Experiment." Journal of Finance, 68(3): 881–929.

Online Appendix

Credit Cycles and Creditor Rights

Martin Kornejew[1] Shohini Kundu[2] Karsten Müller[3]

Contents

A Data Description **A2**

B Full Baseline Local Projection Estimates **A4**

C Robustness of Local Projection Results **A5**

D Additional Local Projection Results **A13**

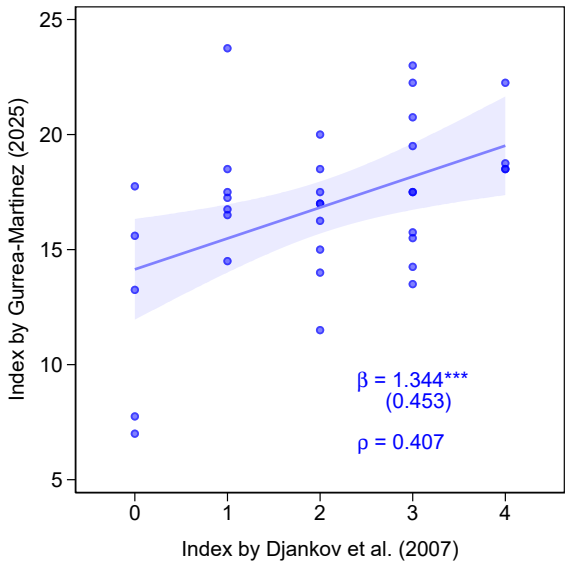
E Differences in Credit Boom Characteristics **A15**

F Additional Results From US Legal Reforms **A16**

[1]Martin Kornejew is at Bocconi University, Milan, Italy. email: martin.kornejew@unibocconi.it
[2]Shohini Kundu is at the Anderson School of Management, University of California Los Angeles. email: shohini.kundu@anderson.ucla.edu
[3]Karsten Müller is at the National University of Singapore, NUS Business School and Risk Management Institute, and CEPR. email: kmueller@nus.edu.sg

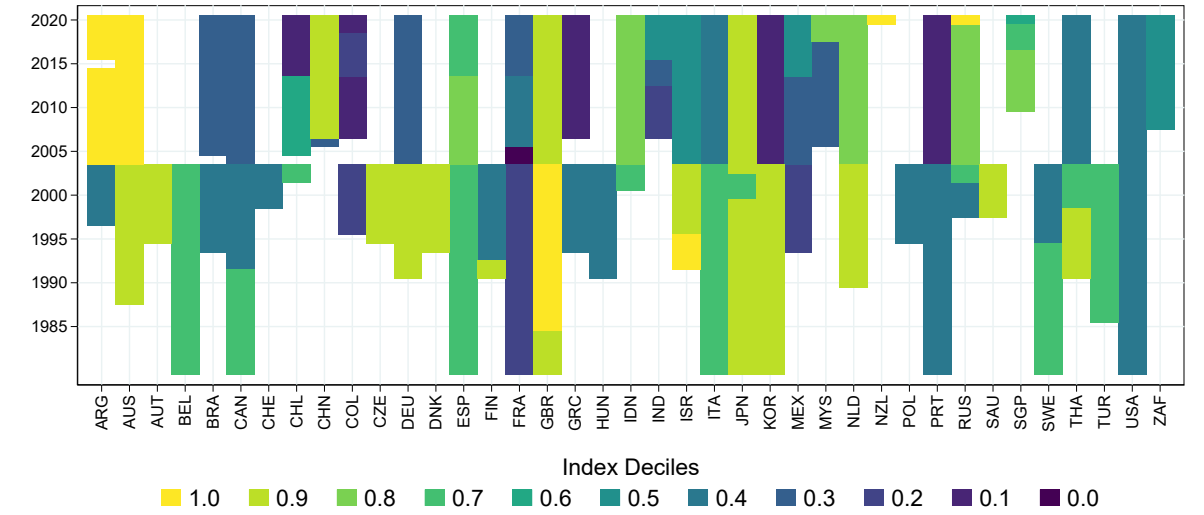
A Data Description

Figure A.1: Correlation Between Creditor Rights Indices



Notes: This figure plots a scatter plot showing the correlation between the creditor rights indeces of Djankov et al. (2007) and Gurrea-Martinez (2025), where the latter focuses on secured creditors. Each dot represents a country in 2003. The line shows the linear fit with its 95% confidence interval shaded. The coefficient and standard error are shown in the lower right corner.

Figure A.2: Percentile Ranks of Creditor Rights Indices across Estimation Sample



Notes: This figure plots the decile rank of each country-year in our baseline sample, using the creditor rights index from Djankov et al. (2007) up to 2004 and the overall creditor friendliness index from Gurrea-Martinez (2025) from 2005 onward.

Table A.1: Macroeconomic Data Summary Statistics for Full Sample

	Full sample					
	N	Mean	SD	Q10	Q50	Q90
Creditor Rights (index percentile)	3,288	58.1	28.2	15.7	69.0	92.8
Business debt-to-GDP ratio (%)	1,112	73.6	34.5	29.0	69.6	123.0
Business debt-to-GDP ratio, 3-year change (pp.)	1,004	2.8	10.3	-8.6	2.4	14.8
Real GDP growth, annual (%)	4,046	3.7	13.4	-3.5	3.8	11.8
Share of nonperforming loans (%)	2,144	7.0	7.9	1.1	3.9	16.9

Notes: This table presents summary statistics for key variables of our macroeconomic database for the maximal coverage for each variable.

B Full Baseline Local Projection Estimates

Table A.2: Estimates of Local Projection Using Equation (2)

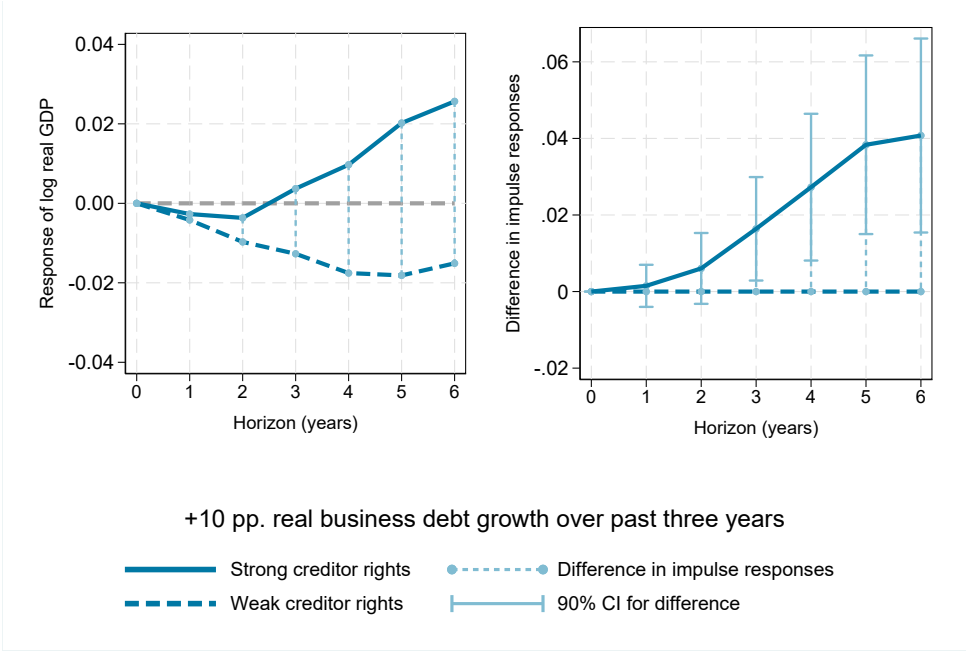
	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$
Δ_3Business total debt rel. to GDP (decimal) × Creditor rights index (percentile)	0.058	0.186**	0.392***	0.508***	0.575***
	(0.041)	(0.074)	(0.085)	(0.106)	(0.120)
Δ_3 Business credit/GDP	-0.091**	-0.211***	-0.373***	-0.452***	-0.464***
	(0.037)	(0.065)	(0.076)	(0.090)	(0.109)
Creditor rights index (percentile)	0.017**	0.036***	0.048***	0.065**	0.082**
	(0.007)	(0.012)	(0.017)	(0.026)	(0.033)
Real GDP growth	0.132	0.247*	0.209	0.197	0.143
	(0.103)	(0.131)	(0.154)	(0.179)	(0.204)
Real GDP growth, last year	0.078	0.070	0.014	-0.027	-0.096
	(0.085)	(0.098)	(0.128)	(0.105)	(0.113)
Real GDP growth, two years ago	-0.018	-0.057	-0.072	-0.174	-0.049
	(0.058)	(0.070)	(0.108)	(0.130)	(0.105)
Real GDP growth, three years ago	-0.001	-0.003	-0.084	0.048	0.018
	(0.062)	(0.079)	(0.098)	(0.108)	(0.120)
Real GDP growth, four years ago	0.068	0.011	0.184**	0.201*	-0.026
	(0.069)	(0.069)	(0.076)	(0.109)	(0.143)
Real GDP growth, five years ago	-0.022	0.120	0.119	0.003	0.029
	(0.061)	(0.086)	(0.111)	(0.102)	(0.123)
Δ Household debt/GDP	0.125	0.255**	0.283***	0.309**	0.229
	(0.135)	(0.114)	(0.093)	(0.142)	(0.146)
Δ Household debt/GDP, last year	0.052	0.005	-0.015	-0.085	-0.357**
	(0.109)	(0.170)	(0.155)	(0.167)	(0.140)
Δ Household debt/GDP, two years ago	-0.048	-0.108	-0.162	-0.436**	-0.478*
	(0.086)	(0.085)	(0.132)	(0.185)	(0.264)
Δ Household debt/GDP, three years ago	-0.113	-0.203*	-0.489***	-0.477***	-0.429***
	(0.085)	(0.108)	(0.140)	(0.166)	(0.115)
Δ Household debt/GDP, four years ago	0.016	-0.230*	-0.223	-0.176	-0.405**
	(0.080)	(0.122)	(0.175)	(0.139)	(0.177)
Δ Household debt/GDP, five years ago	-0.139*	-0.071	-0.132	-0.320	-0.426
	(0.079)	(0.112)	(0.186)	(0.247)	(0.294)
Country FE	Yes	Yes	Yes	Yes	Yes
# of Obs.	657	631	605	579	553
R^2 (within)	0.13	0.19	0.20	0.20	0.19

Notes: The table shows estimates from the local projection regressions of equation (2). Discroll-Kraay standard errors in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

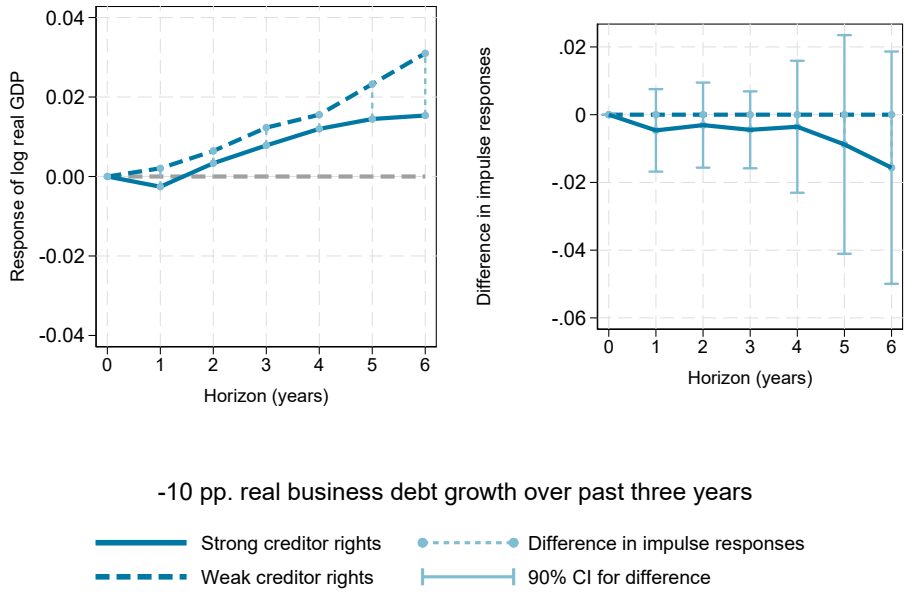
C Robustness of Local Projection Results

Figure A.3: Creditor Rights and Real GDP after Business Credit Expansions and Contractions

(a) Credit Expansion



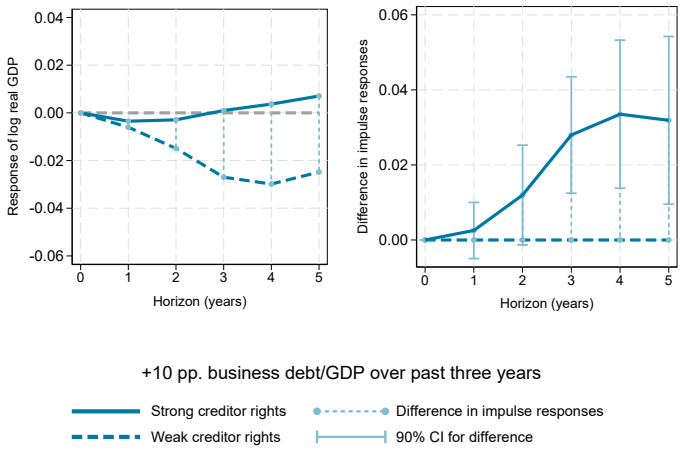
(b) Credit Contraction



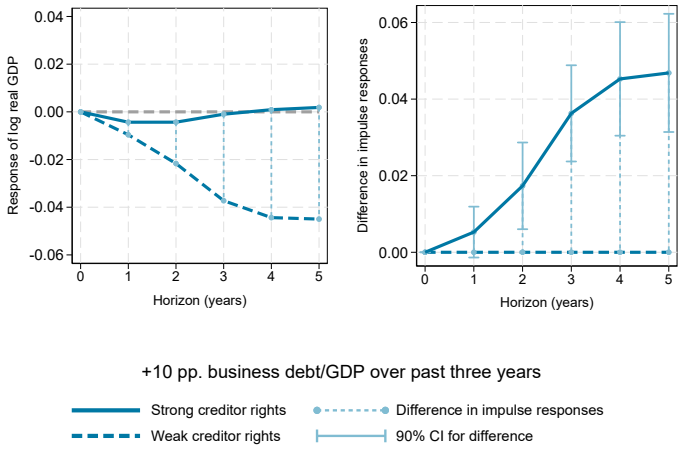
Notes: This figure visualizes estimates from state-dependent local projections with sign asymmetry in the spirit of Ben Zeev et al. (2023): $\Delta_h \log(\text{real GDP}_{i,t+h}) = \alpha_{i,h} + \beta_{1,h}\Delta_3 C_{i,t} + \beta_{2,h}\left(\Delta_3 C_{i,t} \times R_{i,t}\right) + \beta_{3,h} C_{i,t} + \boldsymbol{\gamma}_h \boldsymbol{x}_{i,t} + \Delta^+\left[\beta^+_{1,h} R_{i,t} + \beta^+_{2,h}\Delta_3 C_{i,t} + \beta^+_{3,h}\left(\Delta_3 C_{i,t} \times R_{i,t}\right) + \boldsymbol{\gamma}^+_h \boldsymbol{x}_{i,t}\right] + \epsilon_{i,t}$ for $h = 1, ..., 6$. The indicator variable Δ^+ takes value 1 if $\Delta_3 C_{i,t} > 0$, where $\Delta_3 C_{i,t}$ denotes the three year change of log real business credit. We use real debt growth here rather than the change in the corresponding GDP ratio as before to distinguish between booms and busts based on the variation in debt rather than GDP. Panel (a) shows estimates for credit booms. Panel (b) shows estimates for credit busts. Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights as the solid line and under weak creditor rights as the dashed line. The left graph plots the difference between those impulse responses with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

Figure A.4: Creditor Rights and Real GDP after Business Credit Booms: Institutional Controls

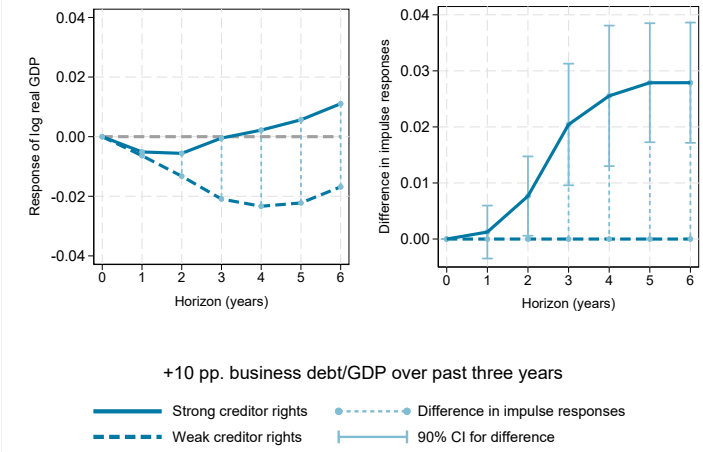
(a) Controlling for Economic Development



(b) Controlling for Financial Development



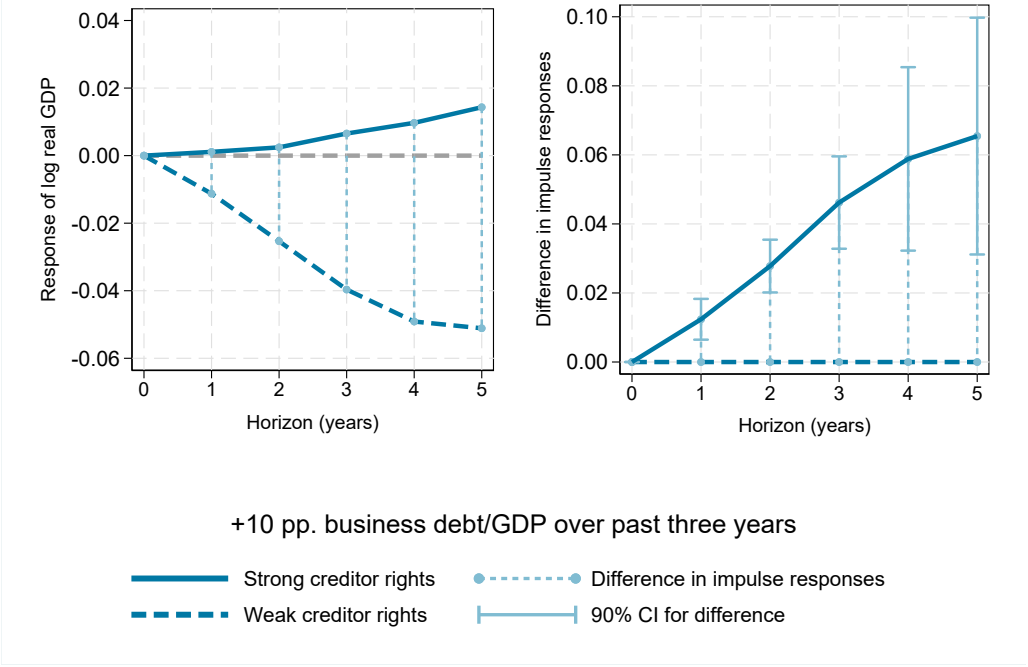
(c) Controlling for Bankruptcy Efficiency



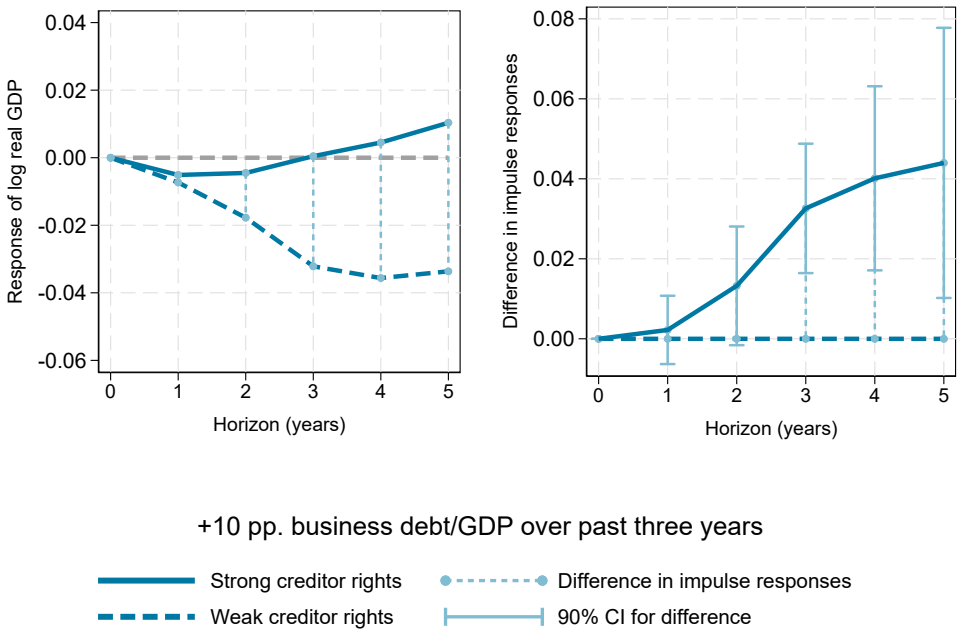
Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for log GDP in real US Dollar and its interaction with $\Delta_3 c_{i,t}$. Panel (b) controls for the level of total private sector debt relative to GDP and its interaction with $\Delta_3 c_{i,t}$. Panel (c) controls for a measure of bankruptcy efficiency and its interaction with $\Delta_3 c_{i,t}$ following Kornejew et al. (2024). Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and under weak creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as the dashed line. The left graph plots the difference between those impulse responses, $\hat{\beta}_{2,h} \times 0.1$, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

Figure A.5: Creditor Rights and Real GDP after Business Credit Booms: Advanced and Emerging Economies

(a) Advanced Economies

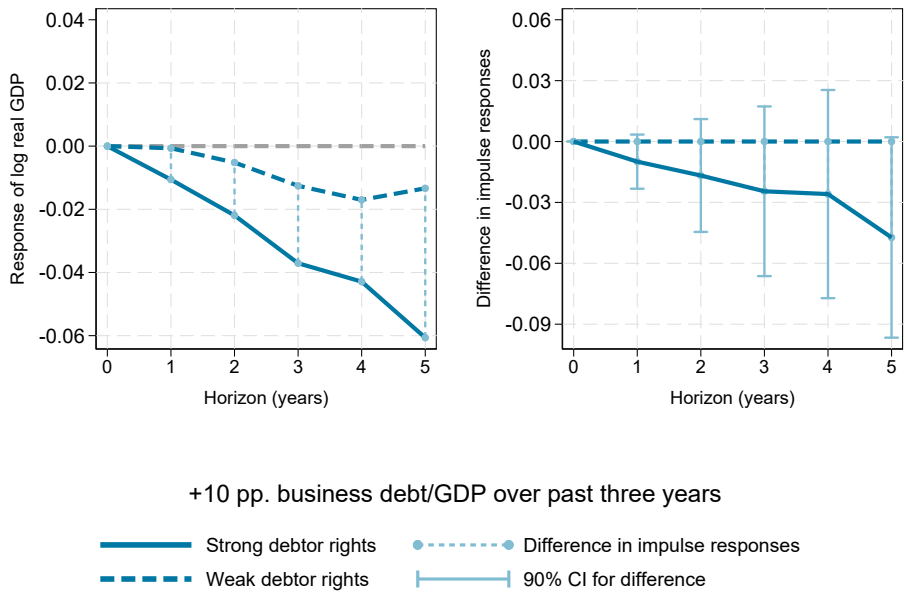


(b) Emerging Economies



Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. We divide the sample into advanced and emerging market economies based on the median GDP per capita. Panel (a) shows estimates of Equation (2) obtained in the subsample of advanced economies. Panel (b) shows estimates of Equation (2) obtained in the subsample of emerging market economies. Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and under weak creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as the dashed line. The left graph plots the difference between those impulse responses, $\hat{\beta}_{2,h} \times 0.1$, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

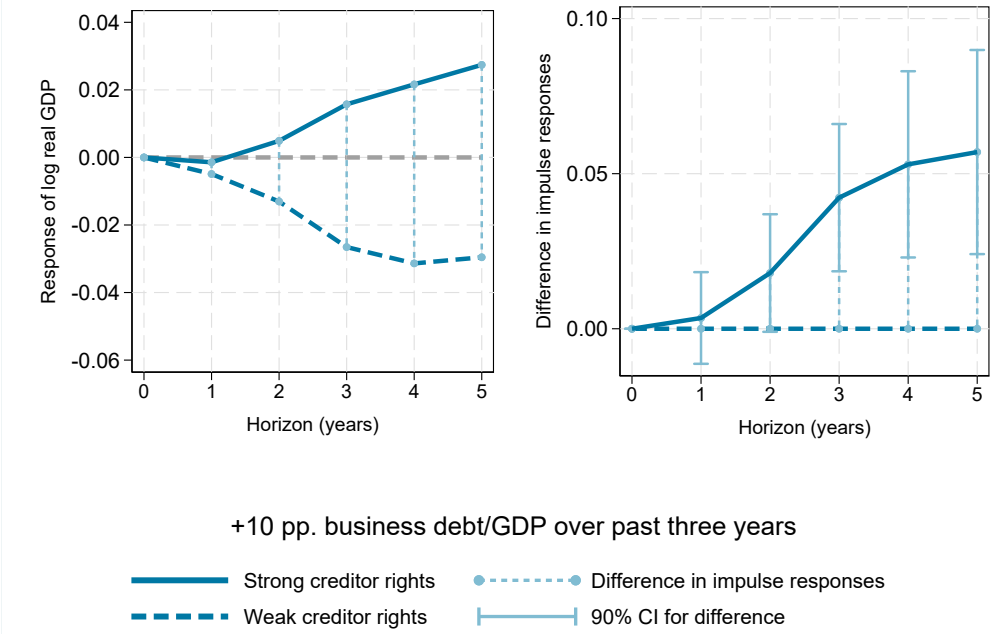
Figure A.6: Debtor Rights and Real GDP After Business Credit Booms



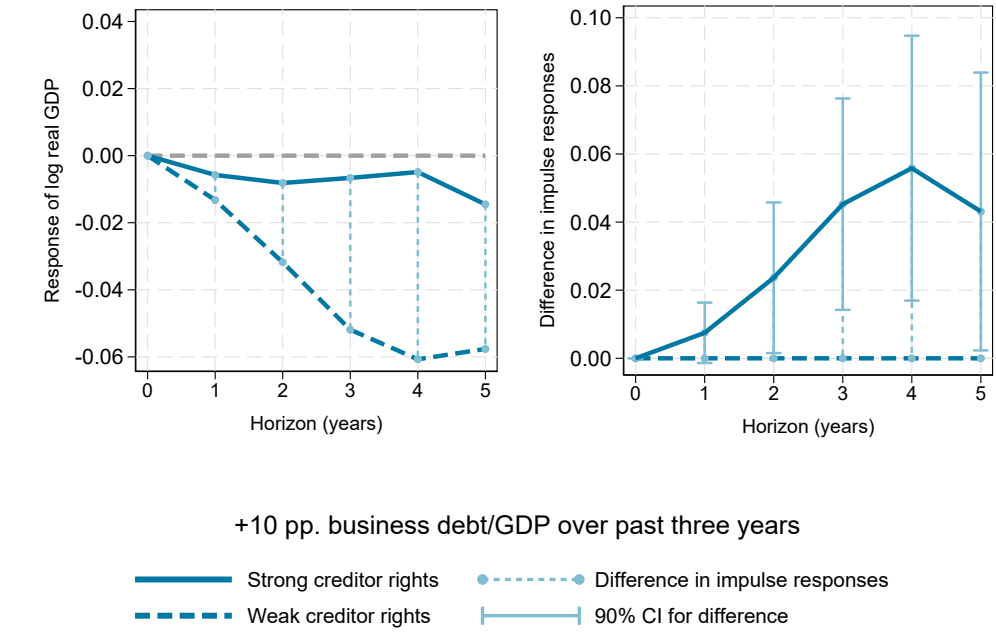
Notes: This figure visualizes estimates from the local projection equation (2) but replacing $L_{i,t}$ by the index of *debtor* friendliness from Gurrea-Martinez (2025). The right panel plots the impulse response in real GDP to a 10 percentage points increase in the business debt to GDP ratio over the preceding three years under strong debtor rights as the solid line and under weak debtor rights as the dashed line. Strong (weak) debtor rights in this plot refer to the the maximal (minimal) value of the index attained in the sample. The left panel plots the difference between those impulse responses, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

Figure A.7: Creditor Rights and Real GDP after Business Credit Booms: Other Measures

(a) Index and subsample of Djankov et al. (2007)



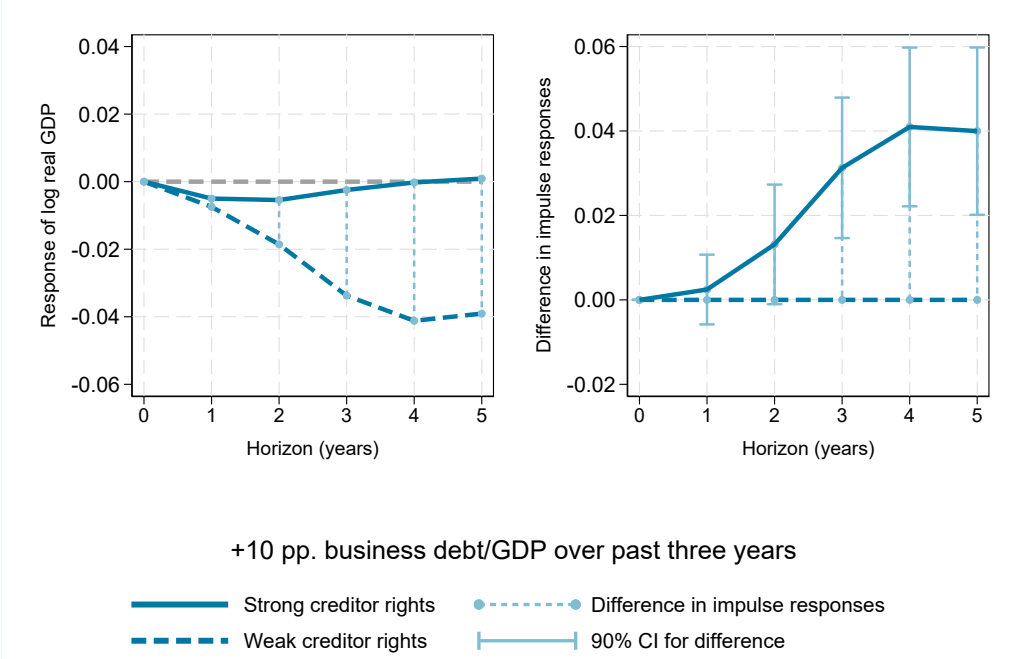
(b) Index and subsample of Gurrea-Martinez (2025)



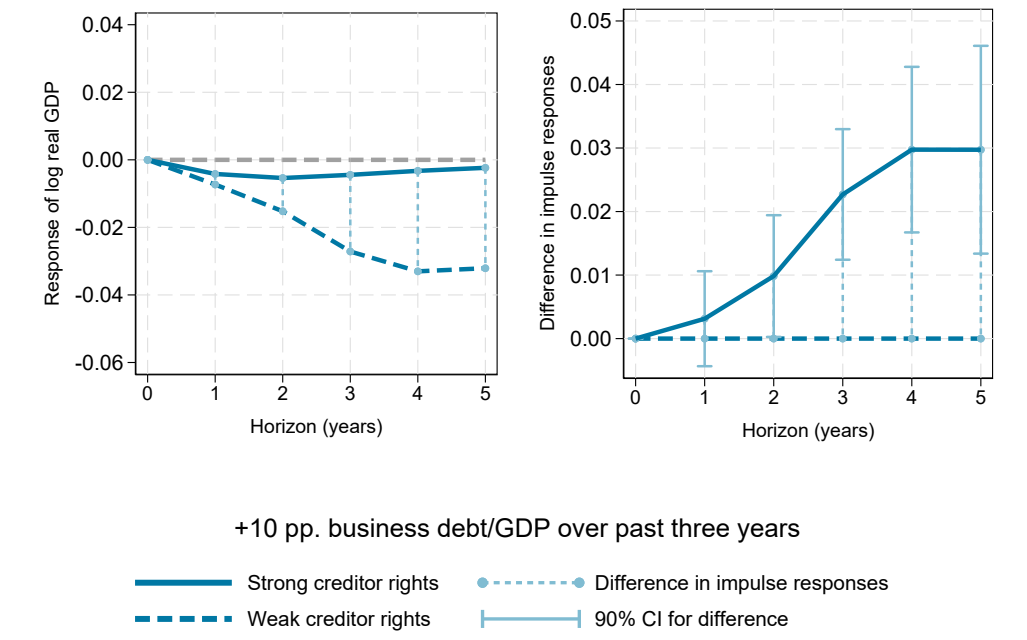
Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates using only the index of Djankov et al. (2007). Panel (b) shows estimates using only the index of Gurrea-Martinez (2025). Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights as the solid line and under weak creditor rights as the dashed line. The left graph plots the difference between those impulse responses with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

Figure A.8: Creditor Rights and Real GDP after Business Credit Booms: Alternative Gurrea-Martinez (2025) Indices

(a) Index Based on Weakest Protection for Secured Creditors



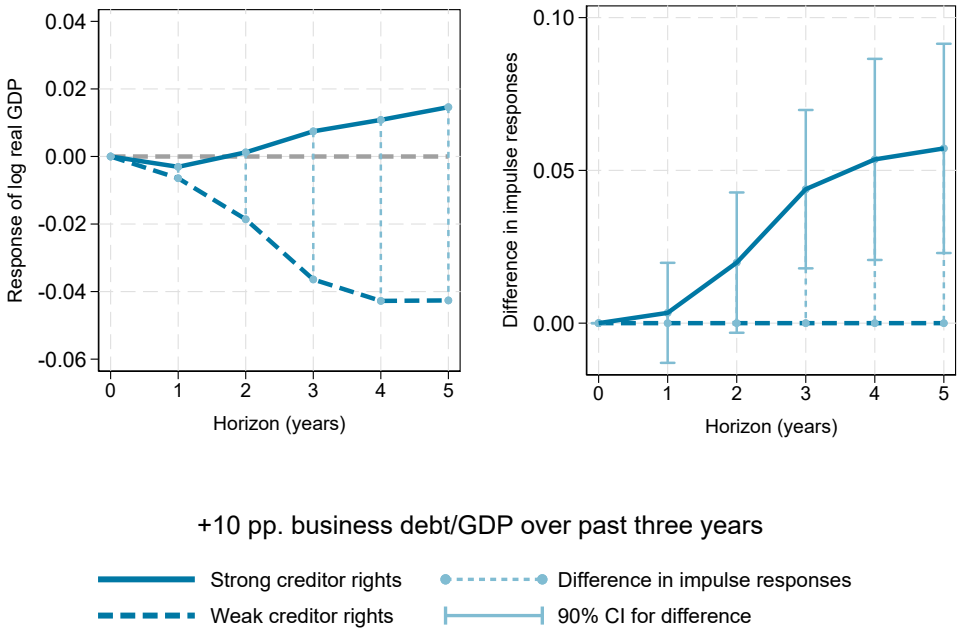
(b) Index Based on Strongest Protection for Secured Creditors



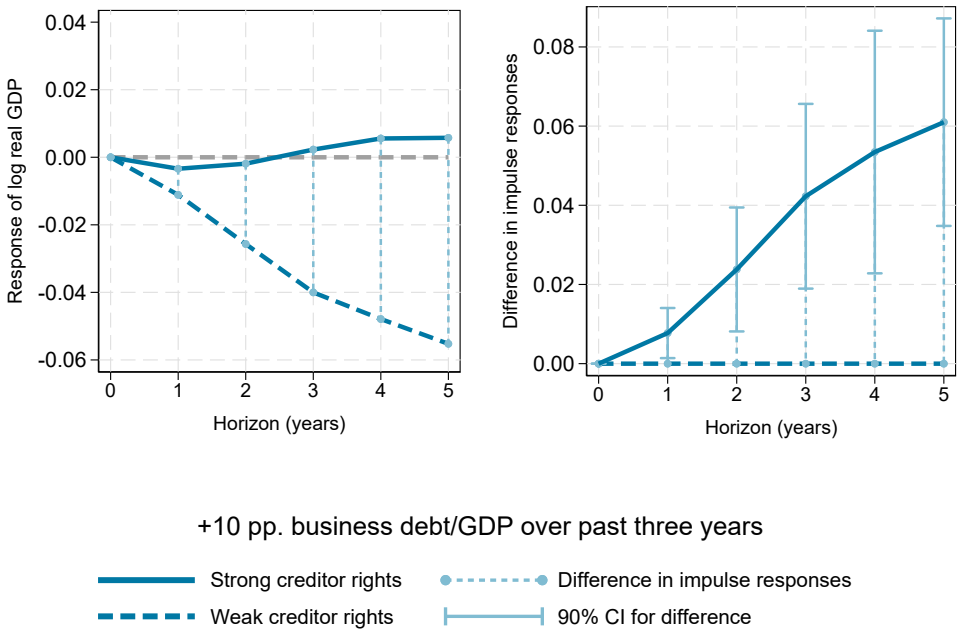
Notes: This figure reports estimates from the local projection equation (2), based on a 10 percentage point increase in the business debt-to-GDP ratio over the preceding three years. When multiple bankruptcy procedures are available in a given country-year, we select alternative indices from Gurrea-Martinez (2025). Panel (a) uses the procedure in which secured creditors have the weakest protection. Panel (b) uses the procedure in which debtors enjoy the strongest protection, reflecting debtor choice in some jurisdictions. In each panel, the right-hand plot shows the impulse response of real GDP for strong (solid line) and weak (dashed line) creditor rights. The left-hand plot shows the difference between these impulse responses, along with 90% confidence intervals based on Driscoll–Kraay standard errors.

Figure A.9: Creditor Rights and Real GDP after Business Credit Booms: Pre- and Post-2003

(a) Before 2003



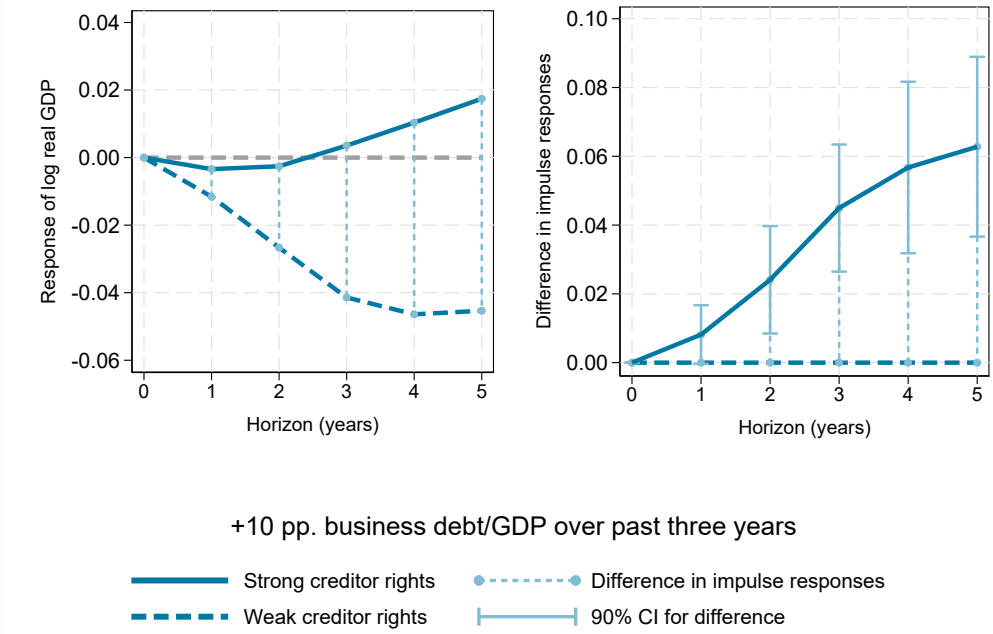
(b) After 2003



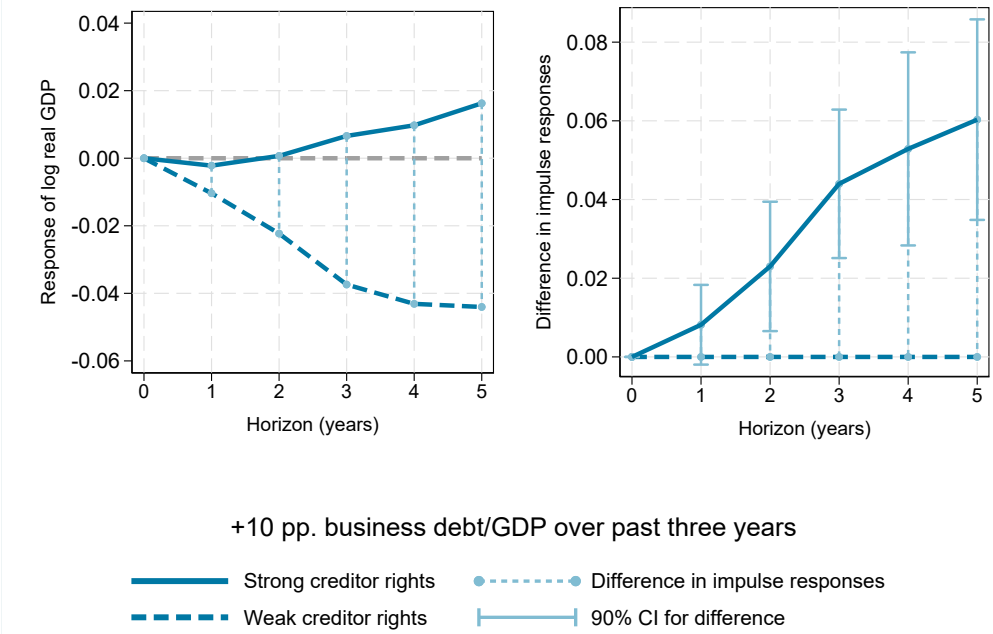
Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates of Equation (2) obtained in the subsample running up until and including 2003 – the median year in our sample. Panel (b) shows estimates of Equation (2) obtained in the subsample starting 2004. Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and under weak creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as the dashed line. The left graph plots the difference between those impulse responses, $\hat{\beta}_{2,h} \times 0.1$, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

Figure A.10: Creditor Rights and Real GDP, Controlling For Boom Characteristics

(a) Real Estate Debt Share



(b) High Yield Share

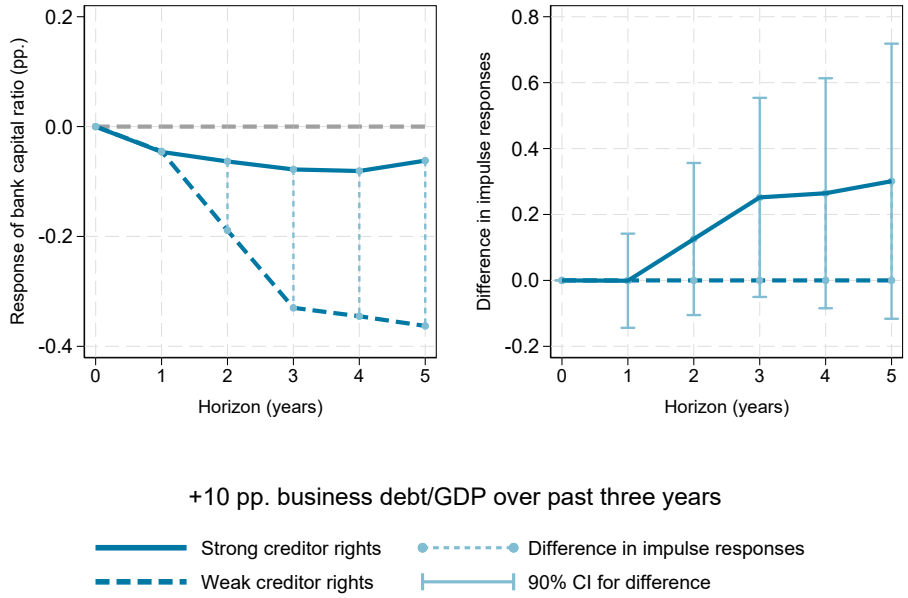


Notes: This figure visualizes estimates from the local projection equation (2) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for the share of credit to real estate and construction and its interaction with $\Delta_3 c_{i,t}$. Panel (b) controls for the share of credit to high-yield firms and its interaction with $\Delta_3 c_{i,t}$ following Kornejew et al. (2024). Within each panel, the right graph plots the impulse response in real GDP under strong creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and under weak creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as the dashed line. The left graph plots the difference between those impulse responses, $\hat{\beta}_{2,h} \times 0.1$, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

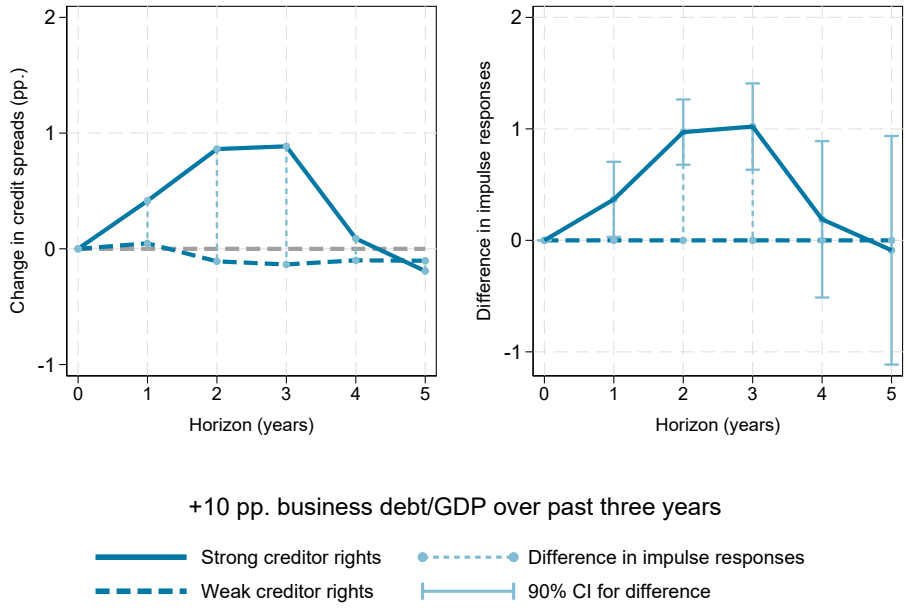
D Additional Local Projection Results

Figure A.11: Creditor Rights, Bank Capital, and Credit Risk Pricing

(a) Bank Capital Ratio



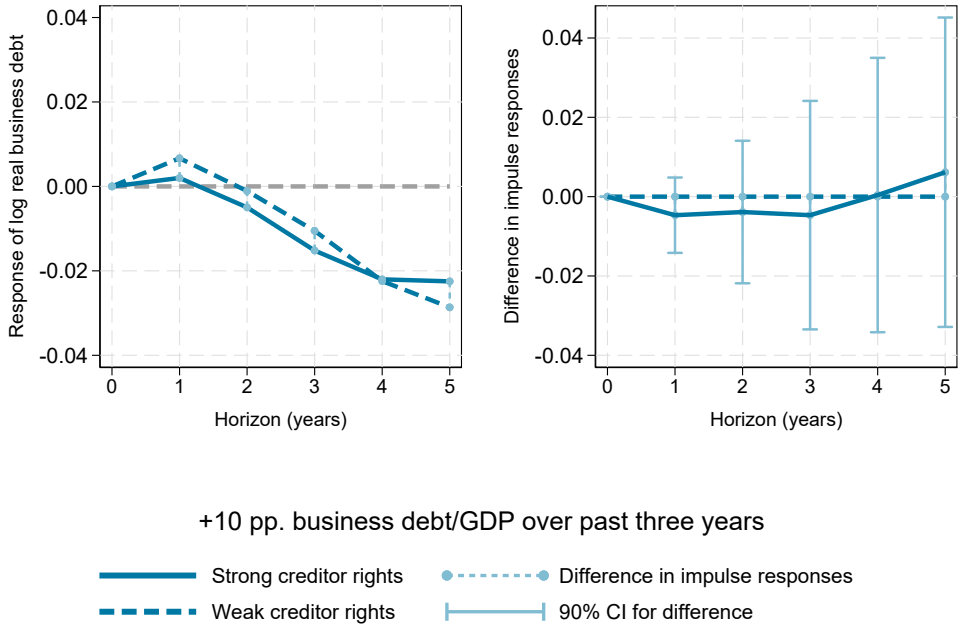
(b) Credit Spreads



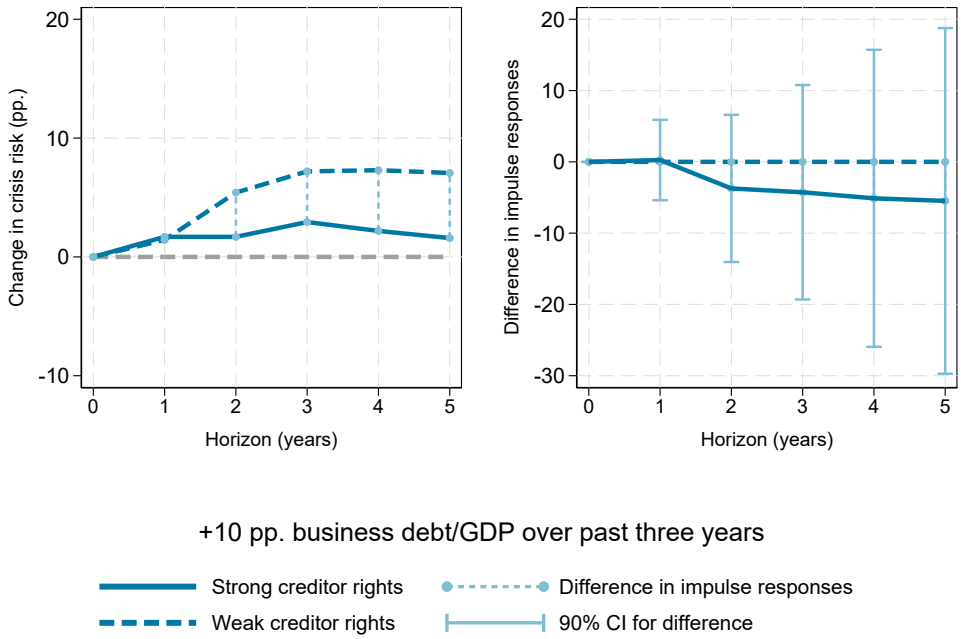
Notes: These figures visualize estimates from the local projections from equation (2). Panel (a) plots the response of the bank capital ratio (bank capital divided by total assets). Panel (b) plots the response of the spread between yields on long-term corporate and government bonds. We show the response for a 10 percentage points increase in the business debt-to-GDP ratio over the preceding three years. The right panel plots the impulse response in credit spreads for economies with the strongest creditor rights ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$) as the solid line and for economies with the weakest creditor rights ($0.1 \times \hat{\beta}_{1,h}$) as dashed. The left panel plots the difference between those impulse responses ($\hat{\beta}_{2,h} \times 0.1$) with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

Figure A.12: Creditor Rights, Deleveraging, and Crises

(a) Log Real Business Debt



(b) Financial Crisis Risk

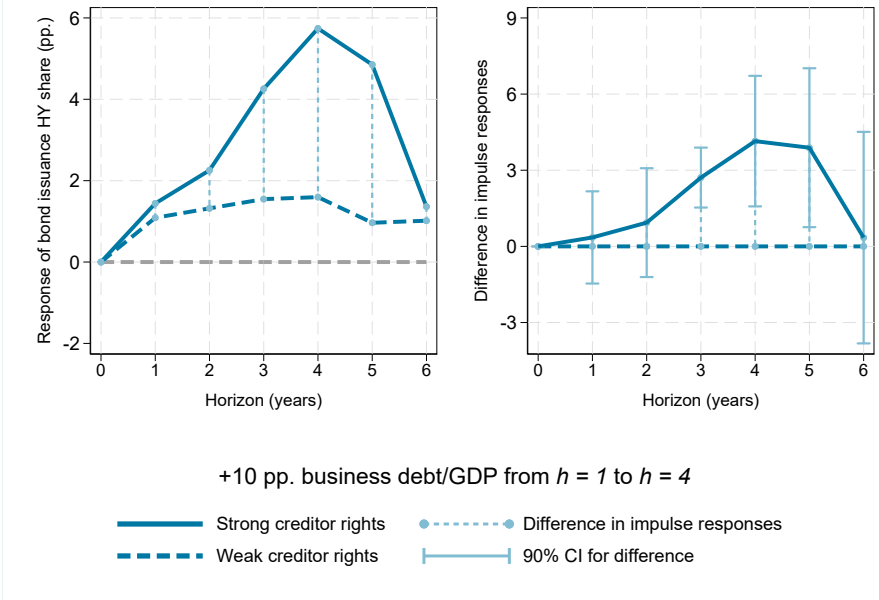


Notes: This figure shows impulse response estimates from local projections following a 10 percentage point increase in the business debt-to-GDP ratio over three years. Panel (a) shows predicted cumulative changes in log real business debt. Panel (b) shows predicted cumulative changes in the probability of financial crisis. Each local projection controls for the contemporaneous value as well as five lags of the dependent variable, real GDP growth and changes in the household debt-to-GDP ratio. Within each panel, the right graph plots the impulse response for a 10 percentage points increase in the business debt-to-GDP ratio over three years under strong creditor rights ($L_{i,t} = 1$) as the solid line and under weak creditor rights ($L_{i,t} = 0$) as the dashed line. The left graphs plot the difference between those impulse responses, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

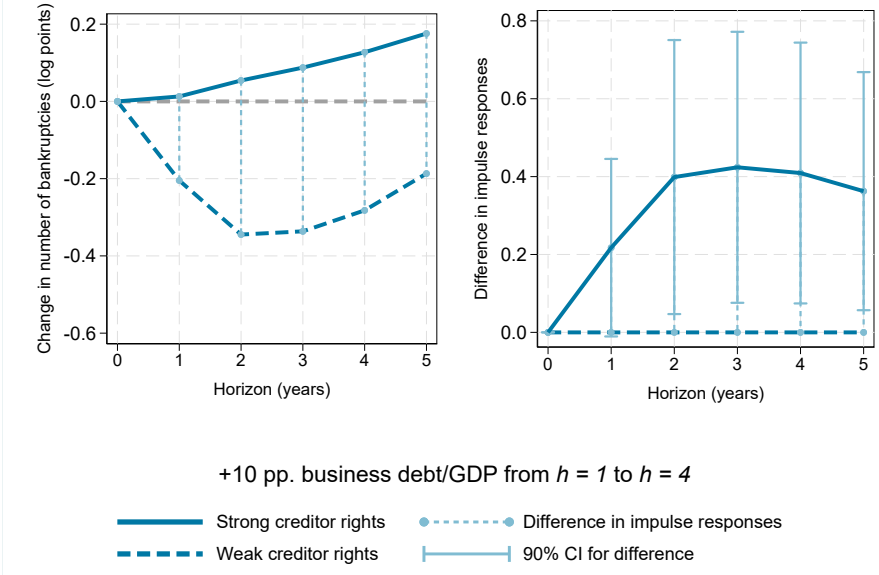
E Differences in Credit Boom Characteristics

Figure A.13: Creditor Rights and the Nature of Business Credit Booms

(a) Risky Firms Debt Share



(b) Bankruptcy Filings

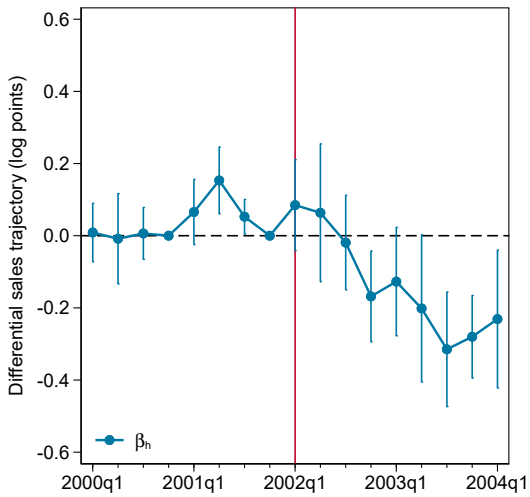


Notes: These figures visualize estimates from local projections as in equation (6) following a 10 percentage points increase in the business debt to GDP ratio over *future* three years, which captures contemporaneous dynamics during the boom. Panel (a) presents the response of the share of annual bond issuance by firms rated "high yield" from Kirti (2025). Panel (b) presents impulse response estimates for the log number of bankruptcy filings. Controls include country fixed effects and five lags of changes in the dependent variable, real GDP growth, annual changes in business credit-to-GDP, and household credit-to-GDP. Within each panel, the left graph plots impulse responses under strong creditor rights as the solid line and under weak creditor rights as the dashed line. The right graph plots the difference between those impulse responses, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

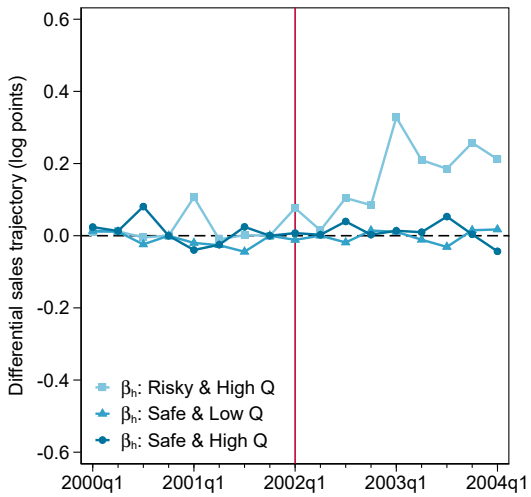
F Additional Results From US Legal Reforms

Figure A.14: Creditor Rights and Sales Reallocation After the Dotcom Boom

(a) Risky firms with low Q



(b) Other subsamples



Notes: The figure plots estimates of coefficient β_h from Equation (3) for different subsamples using log real quarterly sales as dependent variable. The left panel plots point estimates and 95% confidence intervals for firms that are financially distressed and of low quality, i.e., those with a credit rating and Tobin's Q both falling within the lowest tercile of the sample distribution. The right panel plots point estimates for firms that are financially distressed and of high quality ("Risky & High Q"), firms that are financially solid and of low quality ("Safe & Low Q"), as well as firms that are financially solid and of high quality ("Safe & High Q").

Table A.3: Robustness Checks

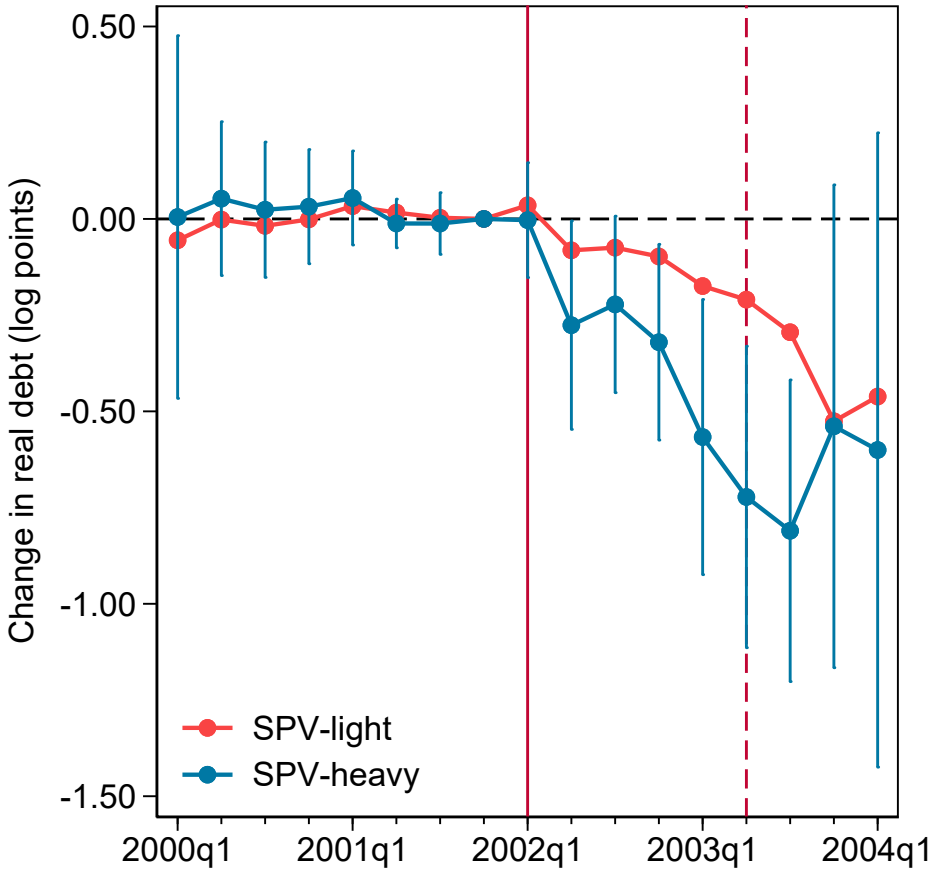
	(1) Baseline	(2) z-score	(3) Excl. Delaware
Low Q × High risk × Strong creditors	-0.165***	-0.117**	-0.342***
	(0.028)	(0.044)	(0.098)
Low Q × High risk	0.025**	-0.016	0.021
	(0.012)	(0.019)	(0.045)
Low Q × Strong creditors	0.053*	-0.021	0.066*
	(0.029)	(0.020)	(0.037)
High risk × Strong creditors	0.081**	0.065*	0.045
	(0.039)	(0.034)	(0.057)
Firm Controls	✓	✓	✓
Firm FE	✓	✓	✓
Quarter FE	✓	✓	✓
Quarter × State FE	✓	✓	✓
Quarter × High Risk FE	✓	✓	✓
Quarter × Low Q FE	✓	✓	✓
# of Obs.	31,131	114,358	10,000
R^2	0.12	0.07	0.20

Notes: This table reports estimates of Equation 5 using alternative risk measures, samples, and dependent variables. Appendix Table A.3 presents robustness checks that vary the measure of firm risk (Altman Z-score instead of credit rating), the sample composition (excluding Delaware firms), and the dependent variable (capital expenditures instead of debt). Column (1) reproduces the baseline specification with the full set of firm controls and fixed effects. Column (2) defines a binary *High Risk* indicator for firms with an Altman Z-score below 1.08—the average Z-score among firms rated below BB– in our sample. Column (3) excludes Delaware-incorporated firms. The Z-score is defined as

$$\text{Altman Z-Score} = 1.2 \cdot \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \cdot \frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3 \cdot \frac{\text{EBIT}}{\text{Total Assets}} + 0.6 \cdot \frac{\text{Market Value of Equity}}{\text{Total Liabilities}} + 1.0 \cdot \frac{\text{Sales}}{\text{Total Assets}}.$$

Standard errors (in parentheses) are clustered at the U.S. state level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure A.15: Delaware's Antirecharacterization Law and Firm Debt Growth, by SPV Intensity



Notes: The figure plots estimates of coefficient β_h from a regression using only risky Delaware firms with low Q similar to Equation (3) but with the main regressor $\mathbb{1}(\text{SPV-heavy})$ identifies firms with an above-median number of subsidiaries likely to be special purpose vehicles (SPVs), following Feng et al. (2009). The plots shows point estimates for both SPV-heavy and SPV-light firms alongside the 95% confidence intervals for the coefficient on $\mathbb{1}(\text{SPV-heavy})$.