Credit Cycles and Creditor Rights*

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March 26, 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. We rationalize our findings with a model in which strong creditor rights facilitate efficient reallocation of capital after credit booms.

*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, the Federal Reserve Board, UCLA Finance Brownbag, UCLA Macro-Finance Brownbag, Bocconi University Brownbag, and National University of Singapore Brownbag as well as audience members at the Chicago-Harvard-Wharton Insolvency and Restructuring conference and CASFI Schumpeter Conference 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).

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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).

What determines which outcome prevails? We highlight the role of creditors' legal clout. The resolution of default is governed by legal institutions that define creditor–debtor relationships —- contract enforcement, statutory protections, and judicial discretion -— which shape the incentives and behavior of both borrowers and lenders during credit booms and their unwinding. 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 describe competing theories to guide our analysis. Theories of the *amplification view* including Kiyotaki and Moore (1997) predict that strong creditor rights exacerbate the macroeconomic ramifications of credit booms 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).[1] 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. We propose a simple model that captures the salient features of our evidence, emphasizing the role of creditor right in promoting efficient capital reallocation after a credit boom.

[1]Our analysis focuses on corporate credit, which accounts for the majority of defaults during severe downturns (Ivashina et al., 2024). 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 empirical 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.[2] 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 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

[2]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."

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.[3]

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 creditor 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 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

[3]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.

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.

Third, we complement research on financial frictions, and credit misallocation. Financial frictions can lead to an inefficient allocation of resources, especially following periods of rapid credit or asset price growth (Midrigan and Xu, 2014; Gopinath et al., 2017; Asriyan et al., 2021). 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."[4]

2 Conceptual Framework

Whether creditor rights amplify or dampen credit cycles is theoretically ambiguous. On one hand, the canonical model of Kiyotaki and Moore (1997) predicts deeper contractions when creditor rights are strong because stronger pledgeability tightens the feedback loop between asset prices and economic activity. Similarly, strong creditors exhibit a bias towards liquidation that can affect temporarily distressed but fundamentally sound firms, and thus amplify fire sales and deepen downturns (Shleifer and Vishny, 1992). We will group these predictions together as the *amplification view*.

On the other hand, stronger creditor rights may discourage firms from excessive risk-taking, protect the net worth of financial institutions during downturns, and enable a more efficient reallocation of credit (Aghion et al., 1992). We propose a simple model in which creditor rights affect the allocation of credit to firms with heterogeneous productivity. The model predicts that strong creditor rights facilitate an efficient credit reallocation after a boom. We will group the model and related literature together as the *dampening view*.

2.1 The Amplification View

Kiyotaki and Moore (1997) point to a possible wedge between asset liquidation values and actual creditor recovery in Footnote 10 of their article. Such a wedge reduces pledgeable collateral value to a fraction $\theta \in [0, 1]$ that can naturally be interpreted as degree of creditor protection. Firms borrowing constraint then becomes

$$Rb_t \leq \theta \, q_{t+1} \, k_t, \tag{1}$$

[4]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.

where Rb_t denotes total future debt burden, q_t the price of collateralizable assets and k_t the borrower's holdings. That is, higher θ directly relaxes borrowing capacity per unit of collateral.

This modification changes the dynamics at the core of the Kiyotaki and Moore (1997) feedback loop. In the baseline model, the difference between the current asset price and its discounted resale value pins down the equity required to hold collateral. With partial pledgeability, only a fraction θ of the next-period resale value can be pledged, so the effective equity (or margin) requirement per unit of collateral becomes

$$m_t(\theta) \equiv q_t - \theta \frac{q_{t+1}}{R}. \tag{2}$$

When $\theta = 1$, this collapses to the familiar case in which the down payment coincides with the one-period user cost. When $\theta < 1$, the wedge $(1-\theta)q_{t+1}/R$ increases the required internal funds per unit of collateral and thereby tightens financing conditions. Constrained firms' asset demand is pinned down by the ratio of net worth n_t to the margin requirement:

$$k_t = \frac{n_t}{m_t(\theta)}. \tag{3}$$

In the high-pledgeability economy, borrowers can support a larger balance sheet for a given n_t, so steady-state credit and collateral holdings are higher. However, the same mechanism amplifies credit-cycle downturns. As in the baseline model, productivity shocks reducing n_t force constrained firms to scale down; asset sales depress prices q_t; lower prices erode n_t further via balance-sheet losses; and the loop continues. Importantly, higher θ reduces $m_t(\theta)$, and thus raises sensitivity of collateral demand to net worth shocks. This leads to sharper declines in asset prices and firm investment as collateral values and borrowing capacity mutually reinforce. In the low-pledgeability economy, by contrast, higher margin requirements dampen leverage and mute the collateral-price feedback, yielding smaller credit cycles but at the cost of tighter financing and greater misallocation of productive assets away from constrained borrowers.

In addition to inefficient tightening of borrowing constraints, adverse economic shocks may be amplified by the liquidation bias of strong creditors: when firms levered from the preceding boom become financially distressed, strong secured creditors do not generally internalize the upside potential of a reorganization and prefer to liquidate right away. Dismembering distressed but economically sound firms directly impairs productivity. Moreover, such liquidations induce asset sales precisely when resale prices are depressed, fueling fire-sale externalities (Shleifer and Vishny, 1992). Negative general equilibrium spillovers from harsher liquidation enforcement have been documented for household mortgages (Mian et al., 2015;

Auclert et al., 2019; Auclert and Mitman, 2023).

The amplification view predicts lower productivity during credit contractions under stronger creditor rights, precipitated by vibrant reallocation of capital away from firms where such capital would generate high marginal products. We will show that those predictions are at odds with the data. Specifically, our evidence shows that credit contractions under stronger creditor rights are associated with stronger output growth and a reallocation of capital *away from* firms with low productivity.

2.2 The Dampening View

Stronger creditor rights may mitigate adverse macroeconomic consequences of credit booms by facilitating capital reallocation of the efficient type. Bian (2020) finds reforms towards stronger creditor rights improve the allocation of capital. Antill and Clayton (2025) show theoretically how crisis interventions that stimulate corporate liquidations can improve aggregate capital allocation if capital constrained banks would otherwise engage in loan evergreening. This ability of capital to be repurposed more productively elsewhere is a key differentiating feature specific to firms, and likely much less important for household debt, which has been the focus of much of the existing empirical literature (e.g., Mian et al., 2015).

We propose a model in which strong *creditor rights* incentivize creditors to liquidate rather than evergreen, and thus improve credit allocation in the aftermath of a credit boom. We highlight the key features of the model in the following; further details can be found in Appendix A.

The model illustrates, in a stylized manner, how a credit expansion fueled by potential productivity gains can lead to misallocation. Strong creditor rights can attenuate such misallocation and the associated output losses after the boom. The model thus helps to rationalize the empirical evidence of vibrant (muted) credit reallocation after credit booms under regimes of strong (weak) creditor rights, and links it to the observed resilience (sluggishness) of real output.

In broad strokes, the model describes a continuum of ex-ante identical firms with investment opportunities exceeding internal funding. Firms can access credit but suffer moral hazard. Productivity of investments is uncertain and ex post heterogeneous across firms. Unproductive firms will be shrunk in bankruptcy if forced by creditors. The model combines two basic channels through which legal protection of creditors improves capital allocation: First, stronger protection gives creditors greater power to shut down relatively unproductive firms

("liquidation channel"). Second, stronger protection eases financing constraints of deserving firms ("credit access channel"). Arguably, both channels also operate outside credit cycles. But they are particularly consequential when much investment is funded by credit, i.e., after a credit boom.

The model features a unit mass of firms run by owner-managers and a representative bank which is deep-pocketed and equity financed. All agents in the model share the same discount rate, which is normalized to zero without loss of generality. Bankruptcy procedures are perfectly efficient, but firm owner-managers are biased towards continuation in the sense of avoiding bankruptcy unless forced by creditors.[5] At time 0, firms are identical, have internal equity funds ϵ and access to bank credit b_f for investment k_f. Productivity at time 1 will be heterogeneously distributed across firms.

Ex-post restructuring When uncertainty about productivity resolves, firms may have to undergo bankruptcy—i.e., formal operational and financial restructuring. Bankruptcy shrinks the firm to its ex-post optimal scale at no cost and sells excess capital. Resulting bankruptcy value $B(a_f, k_f)$ is split between the bank and firm owner-managers. The bank receives fraction κ, but never more than contractual debt claims. Firm owner-managers receive residual value $B(\cdot) - B_b(\cdot)$. Importantly, the bank will force the firm into bankruptcy only when the bank's bankruptcy payoff is larger than what the firm can pay outside bankruptcy:

$$X(a_f, k_f, b_f) = \mathbb{1}\left[a_f k_f^{\alpha} < B_b(\cdot)\right] \tag{4}$$

Firm's problem Anticipating ex post restructuring outcomes at time 0, firms purchase capital k_f so as to maximize the expected equity payoffs. We assume firms to follow a pecking order of funds—internal cash, credit, equity issuance. For simplicity, equity issuance costs are assumed to be prohibitively large, translating into a non-negativity constraint for equity transfers. Importantly, we assume that contracting frictions make the price of debt q_f insensitive to changes in the investment choice. To contain the resulting moral hazard, creditors set a credit

[5] This assumption is consistent with private benefits of control and manager incentives of empire building and avoiding bankruptcy.

constraint $\bar{b}_f$.

$$\max_{k_f \geq 0} \epsilon - k_f + q_f b_f + \mathbb{E}\Big[\Big(1 - X(\cdot)\Big) \max\left\{a_f k_f^{\alpha} - b_f), 0\right\} + X(\cdot)\Big(B(\cdot) - B_b(\cdot)\Big)\Big] \tag{5}$$

s.t.

$$\epsilon \geq \epsilon - k_f + q_f b_f \geq 0 \tag{6}$$

$$b_f \leq \bar{b}_f \tag{7}$$

We assume that the expected productivity shock $\mathbb{E}[a_f]$ is large enough relative to internal funds ϵ, such that $b_f = k_f - \epsilon$ at the optimum.

Bank's problem We assume that the bank sets credit constraints $\bar{b}_f$ to avoid losses even under the worst possible ex post scenario $a_f = 0$. We further assume that the bank prices debt competitively, i.e., equating it with the expected value of a unit debt. Hence, the bank sets

$$\bar{b}_f = \kappa B\Big(0, k_f^*(\bar{b}_f, q_f)\Big) = \kappa k_f^*(\bar{b}_f) \tag{8}$$

$$q_f = 1 \, \forall f \tag{9}$$

Model implications Because firms are ex ante identical and exposed to the same future possibilities, all firms face the same credit constraint, and invest and borrow the same amount. Hence, firm indices f will be dropped in the following except for productivity a_f.

Maintaining the assumption that expected future productivity is large enough relative to ϵ, credit demand is positive and the credit constraint binds for sufficiently small κ.[6] When the credit constraint binds, investment is $k^*(\bar{b}) = \bar{b} - \epsilon$. Plugging this into (29) and rearranging yields

$$\bar{b} = \frac{\kappa}{1 - \kappa}\epsilon \tag{10}$$

Hence, under binding credit constraints the laissez-faire optimal investment and the bankruptcy condition become

$$k^* = \frac{\epsilon}{1 - \kappa} \tag{11}$$

$$X(a, k^*, \bar{b}) = \mathbb{1}\left[a_f < \kappa\left(\frac{\epsilon}{1 - \kappa}\right)^{1-\alpha}\right] \tag{12}$$

[6] This is because $\bar{b}|_{\kappa=0} = 0$ as per (29).

Derivatives with respect to κ of investment as well as productivity bankruptcy threshold are strictly positive within its domain. Two lemmas follow from that:

Lemma 2.1 (Credit Access Channel)**.** *When credit constraints matter, investment monotonically increases in κ.*

Lemma 2.2 (Liquidation Channel)**.** *When credit constraints matter, the share of firms liquidating assets monotonically increases in κ.*

Lemma 1 implies that higher κ increases aggregate capital before liquidations. Lemma 2 implies that higher κ increases the prevalence of efficient liquidations. Jointly, this implies that higher κ decreases misallocation and increases output ex post. Precise quantities will depend on the functional form of F, also see next subsection. Please see Appendix A for the planner's solution and the behavior of unconstrained firms.

Appendix Figure A.1 illustrates model comparative statics for different creditor rights regimes indexed by κ.[7] It shows how the distribution of firm size and marginal products of capital (MPK) differ between the two calibrations. Stronger creditor rights align the allocation of capital more closely with the first best as creditors force more firms to liquidate assets ex post and shrink to their efficient size (liquidation channel). Moreover, stronger creditor rights increase the size of more productive firms by relaxing credit constraints (credit access channel). Both effects compress the distribution of MPKs. Stronger creditor rights i) limit the mass of firms with very high MPKs (credit access channel) while ii) moving firms with low capital productivity to an efficient MPK of 1 (liquidation channel). For an examination of the relative importance of both the credit access and liquidation channels, see Appendix A.

Finally, stronger creditor rights may mitigate adverse macroeconomic consequences of credit booms in two additional ways. First, stronger enforcement and control rights can discipline borrower ex-ante, as in Holmström and Tirole (1997) and Hart and Moore (1998): when default credibly entails loss of control and liquidation, borrowers internalize more of downside risk and will adopt more prudent and less reckless investment decisions when credit conditions are loose. Second, strong creditor protections raise recovery values, reduce strate-

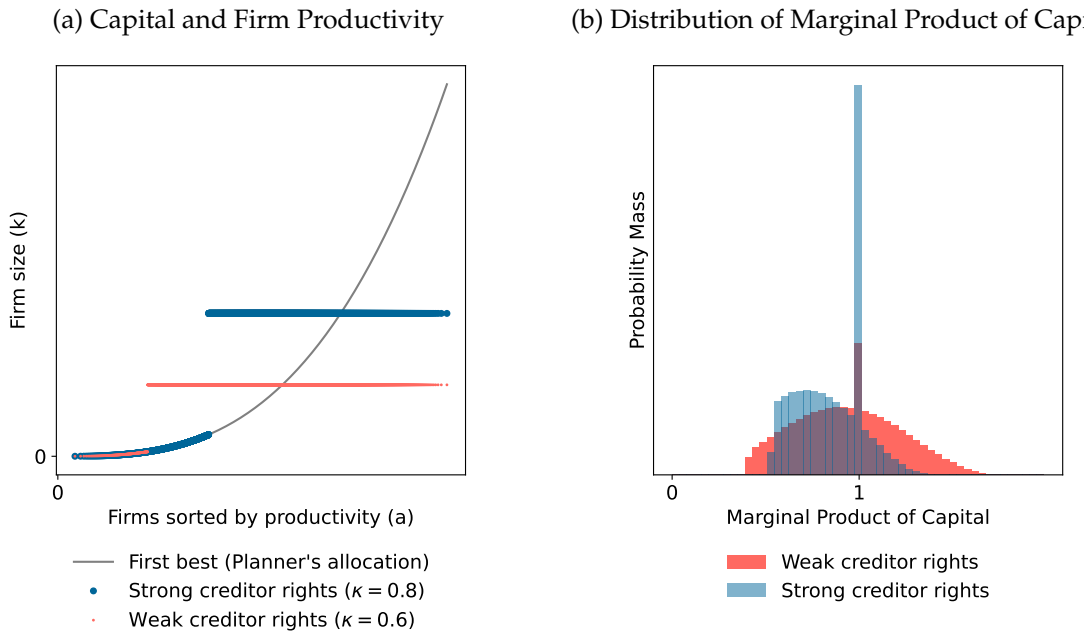
[7] For the numerical illustration, we need to assume a functional form for F. Specifically, we assume a symmetric bell-shaped Beta distribution, scaled to cover over the interval $[0, \bar{a}]$:

$$\frac{a_f}{\bar{a}} \sim B(4,4) \tag{13}$$

Moreover, we set $\bar{a} = 1$, $\alpha = 2/3$ and $\epsilon = 0.02$ and contrast model solutions for $\kappa \in \{0.6, 0.8\}$.

Results are qualitatively identical when choosing other reference points for κ as long as firms remain credit constrained. Moreover, parameter values guarantee $\arg\max_k \mathbb{E}[a_f]k^\alpha > \epsilon$; or equivalently expected marginal product of capital at $k = \epsilon$ to be greater than one, $\mathbb{E}[a_f]\alpha\epsilon^{\alpha-1} > 1$.

Figure 1: Capital Allocation under Strong and Weak Creditor Rights



Notes: This figure illustrates the ex post allocation of capital across firms and how the model generates misallocation. The left panel plots the capital of each firm indexed by ex post productivity after potential liquidations took place. The right panel posts the resulting dispersion of marginal products of capital. Model solution under relatively strong creditor rights ($\kappa = 0.8$) is shown in blue. Model solution under relatively strong creditor rights ($\kappa = 0.6$) is shown in red.

gic default, and lower loan losses, which is consistent with the empirical evidence (Davydenko and Franks, 2008; Ghent and Kudlyak, 2011; Rodano et al., 2016; Tantri, 2020; Heitz and Narayanamoorthy, 2021). The improved balance sheet position, in turn, preserves the ability of financial institutions to provide credit to the real economy.

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.[8] Our sample includes both advanced and emerging economies, spanning a wide range of legal institutions, levels of financial development, and macroeconomic conditions.

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

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 features 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.3 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.4 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 se-

curities 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. We complement this baseline measure of credit risk using Altman z-scores calculated from standard financial ratios, shown below.

$$\begin{aligned}\text{Altman Z-Score} = 1.2 \cdot \frac{\text{Working Capital}}{\text{Total Assets}} + 1.4 \cdot \frac{\text{Retained Earnings}}{\text{Total Assets}} + 3.3 \cdot \frac{\text{EBIT}}{\text{Total Assets}} \\ + 0.6 \cdot \frac{\text{Market Value of Equity}}{\text{Total Liabilities}} + 1.0 \cdot \frac{\text{Sales}}{\text{Total Assets}}\end{aligned} \tag{14}$$

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.[9] 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.

[9] 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.

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 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:

$$\Delta_h \log(y_{i,t+h}) = \alpha_{i,h} + \beta_{1,h}\Delta_3 c_{i,t} + \beta_{2,h}\Big(\Delta_3 c_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{15}$$

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 consequences 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.

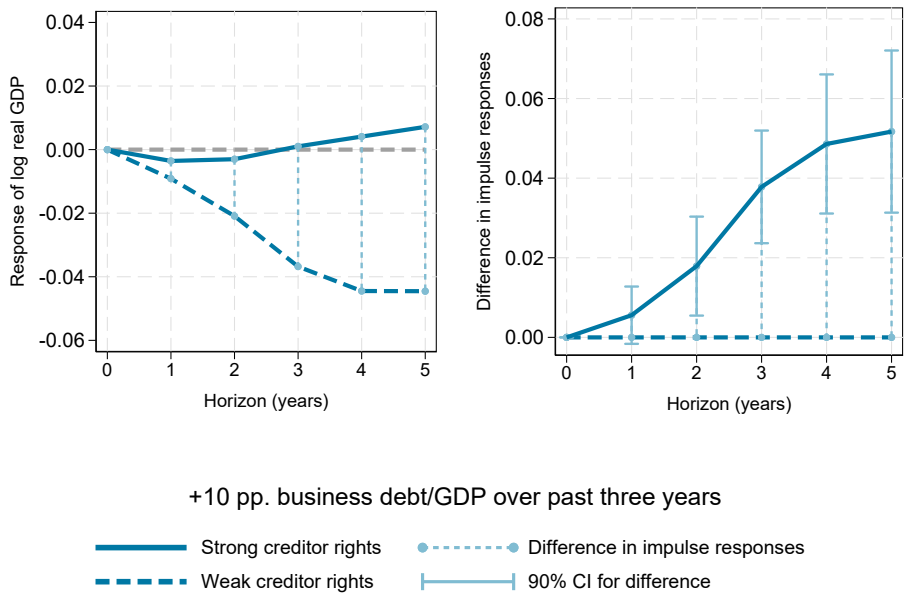
The vector of controls, $\boldsymbol{x}_{i,t}$, includes lagged real GDP growth and the contemporaneous change in household debt-to-GDP, allowing us to disentangle the role of business credit from broader credit market dynamics. We also include horizon-specific country fixed effects, $\alpha_{i,h}$,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

A potential concern with interpreting the estimates of equation 15 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 (15) 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., Caballero et al., 2008; 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.5 distinguishes between credit expansions and contractions by using local projections that allow for sign asymmetry as in Ben Zeev et al.

(2023).[10]

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.12a 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.12b 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.6a, 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.6b, 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

[10] 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 15 for each group. Appendix Figure A.7 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.6c, 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.8). 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.9 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.10 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.11 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 15, where the dependent variable is the ratio of NPLs.

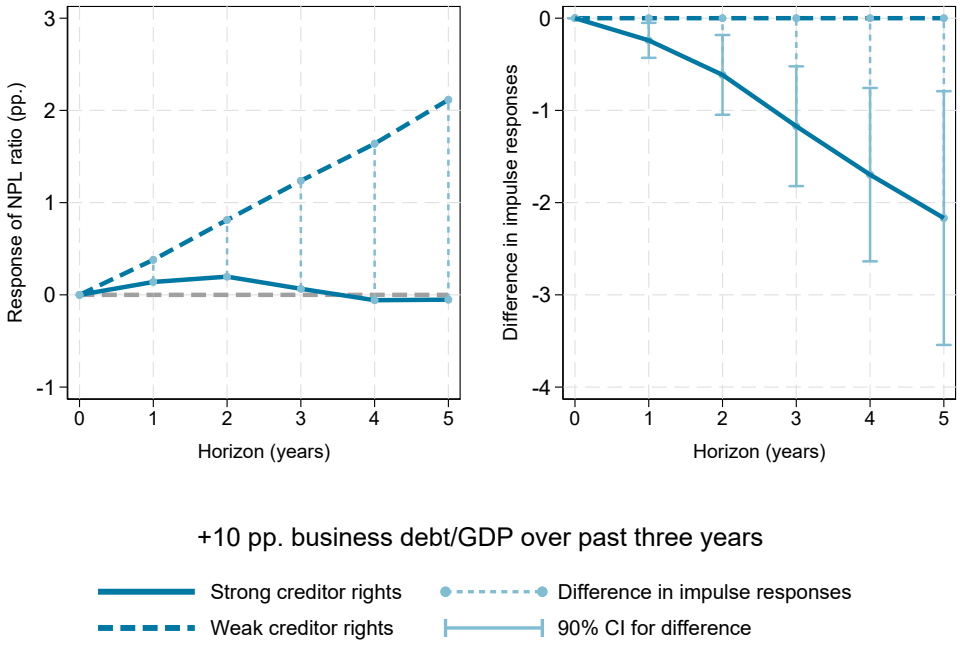
We find that credit expansions lead to significantly larger increases in NPLs in countries with weak creditor rights.

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 lower recovery rates that amplify loan losses, but they could also indicate that banks face greater incentives to defer loss recognition on problem loans.

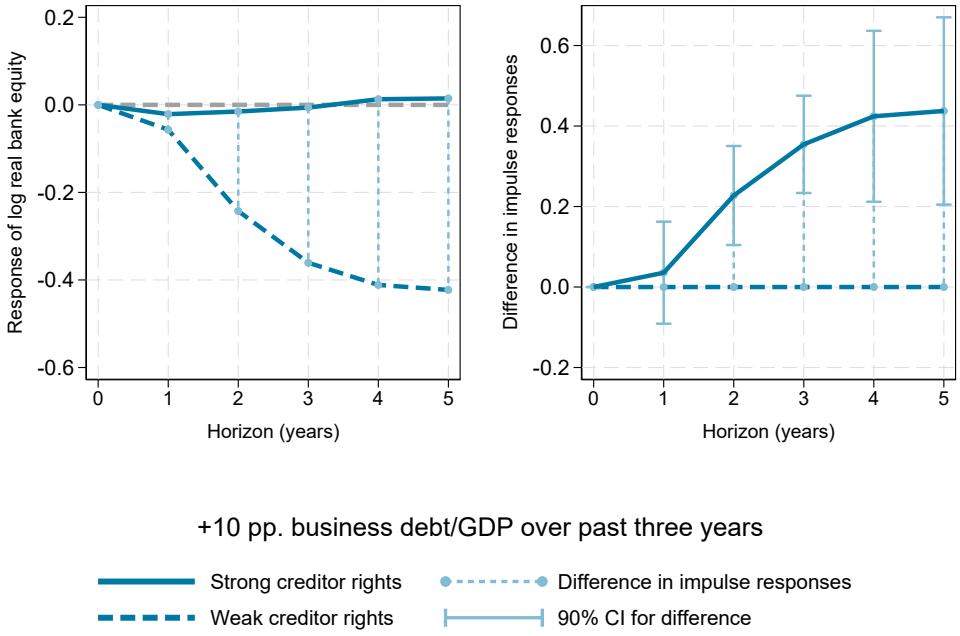
Second, we use newly collected data on bank capital ratios, which measure the value of the banking sector's book capital relative to total assets. Appendix Figure A.13a finds complementary results: credit expansions in countries with strong creditor rights are associated with more stable bank capital 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.14 tests this prediction across two dimensions. Appendix Figure A.14a examines changes in aggregate business debt, while Appendix Figure A.14b 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 (15), where the

dependent 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.

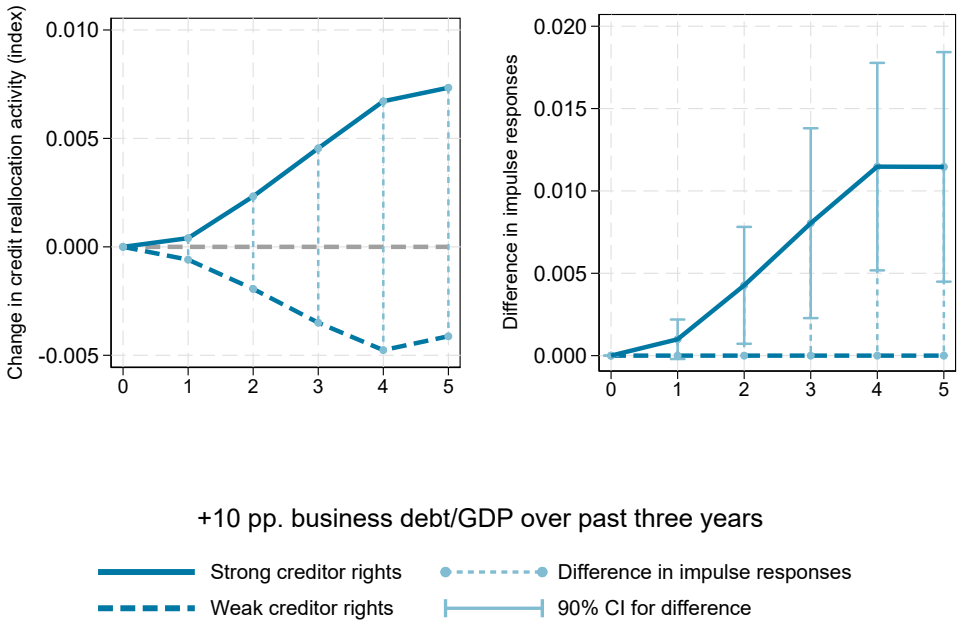
We also find evidence that, where creditor rights are stronger, the aftermath of credit booms is associated with a reduction in credit to risky firms. Figure 4b plots these results. Using data on the riskiness of corporate bond issuance from Kirti (2025), we show that the share of high yield issuance declines sharply after booms where creditor rights are strong but remains elevated where they are weak. Appendix Figure A.13b 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.[11]

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

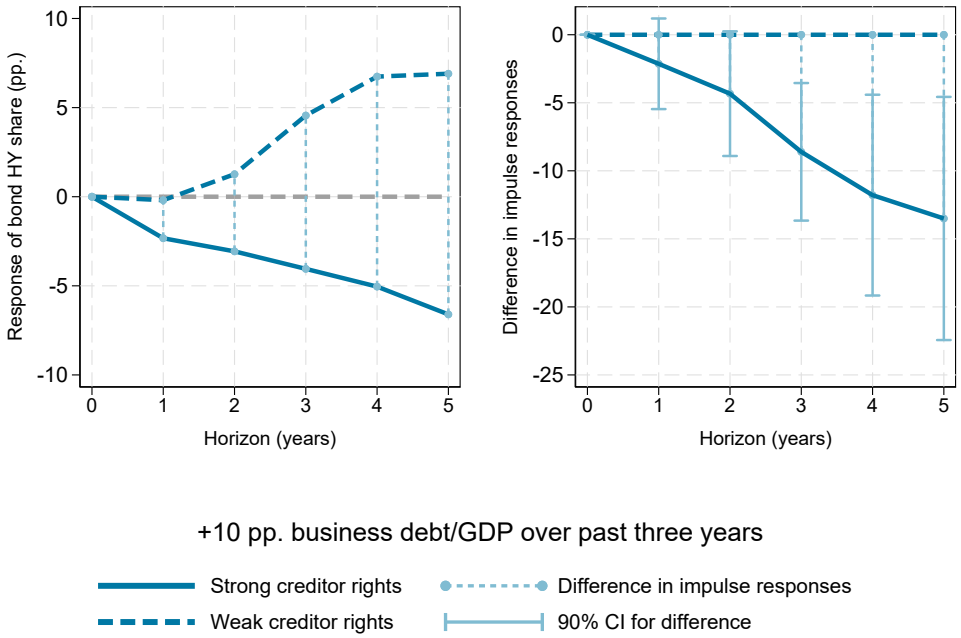
[11] Although our mechanism operates primarily through banks, corporate bond market outcomes remain informative for several reasons. First, in many economies banks are significant holders of corporate bonds, so the same recovery prospects and incentive distortions that affect bank lending can also influence 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 (15), 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.[12] 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.[13] The debt contracts of corporate borrowers became subject to stronger creditor rights once the state of the firm's incorporation adopted antirecharacterization laws.[14]

[12] 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.

[13] 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.

[14] 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).[15] 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.[16]

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.

[15] 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 erosion 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.

[16] 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.[17]

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.5).

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.[18]

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-

[17] 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.

[18] 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:

$$\Delta_h \log(\text{debt}_{f,2001q4+h}) = \beta_h \mathbb{1}(\text{Delaware})_f + \gamma_h \boldsymbol{x}_{f,2001q4} + \epsilon_{f,2001q4+h} \tag{16}$$

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.

$$Q_{f,q} = \frac{\text{book value of debt}_{f,q} + \text{market value of equity}_{f,q}}{\text{book value of assets}_{f,q}}. \tag{17}$$

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.17 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

$$\Delta \log(\text{debt}_{f,q}) = \gamma_f + \tau_t + \beta_{R(f,q-1),Q(f,q-1),L(f,q-1)} + \epsilon_{f,q} \tag{18}$$

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.16. 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 (18). 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.

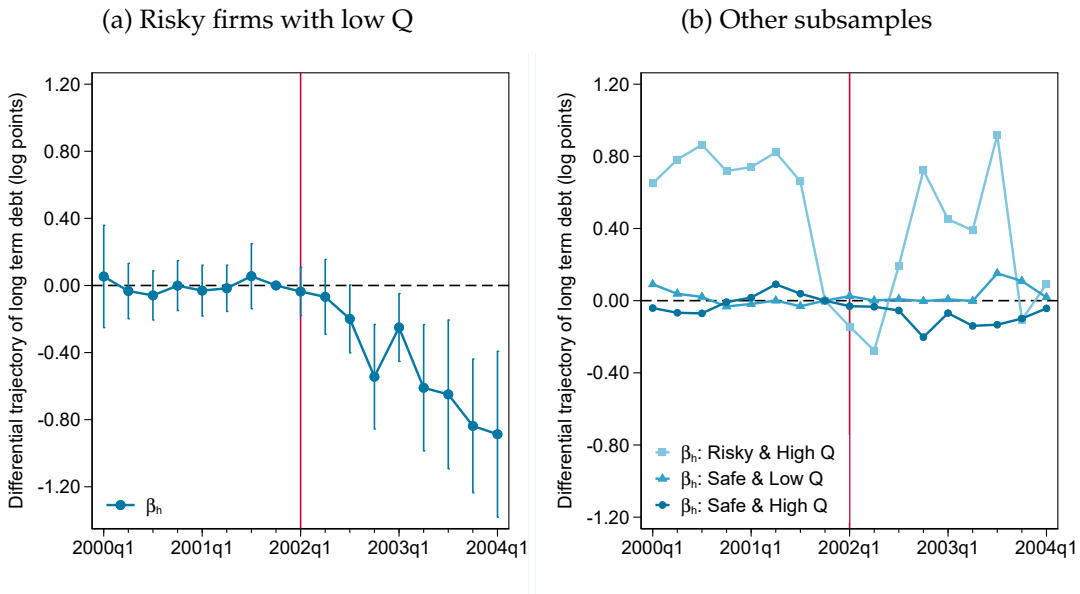
Appendix Table A.3 presents estimates from alternative specifications that vary measures of firm risk (Z-score instead of rating), sample composition (excluding Delaware), and the dependent variables (capital expenditure instead of debt). Our conclusions remain robust across all specifications, suggesting 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

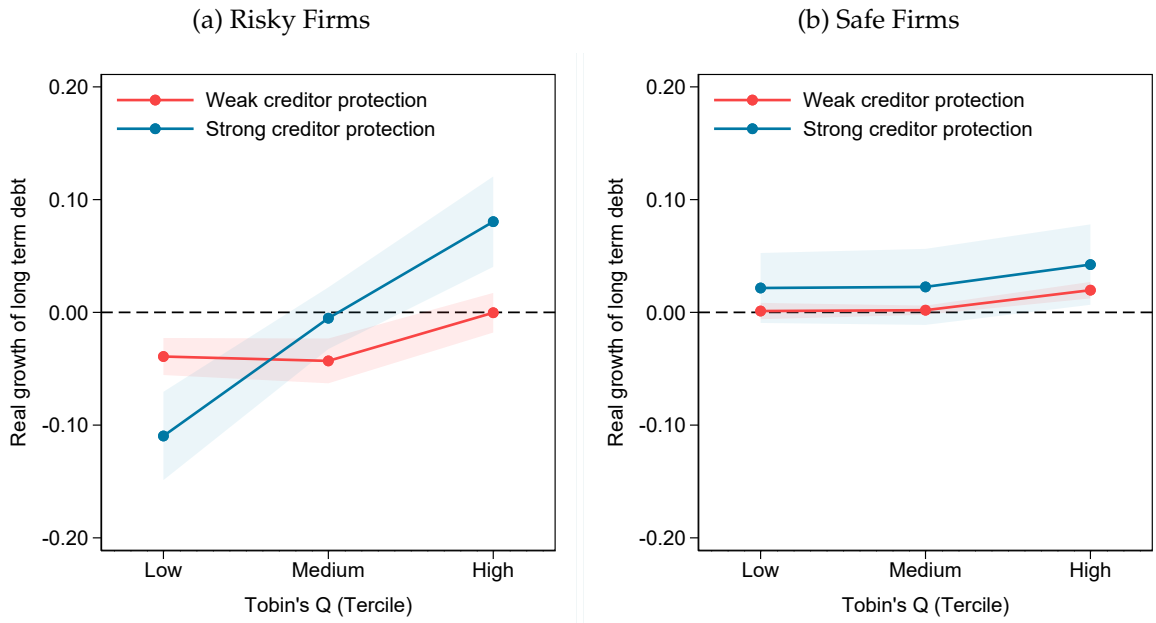
non-performing loan ratios. When credit flows away from unviable firms and toward productive uses, the economy can adjust more efficiently and avoid unnecessary additional defaults. Conversely, under weak creditor rights, banks remain locked into lending relationships with low-quality, risky borrowers, 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 (16) 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 (18). 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 (18) 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 between the frequency and size of credit booms and the macroeconomic costs of their unwinding. 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 $h \in \{1, 2, ..., 6\}$:

$$\begin{aligned}\Delta_h c_{i,t+h} = \alpha_{i,h} + \beta_{1,h} \mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \\ + \beta_{2,h} \Big(\mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \times L_{i,t} \Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t}\end{aligned} \tag{19}$$

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 $h \in \{1, 2, ..., 5\}$:

$$\Delta_h c_{i,t-1+h} = \alpha_{i,h} + \beta_{1,h}\Delta A_{i,t} + \beta_{2,h}\Big(\Delta A_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{20}$$

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

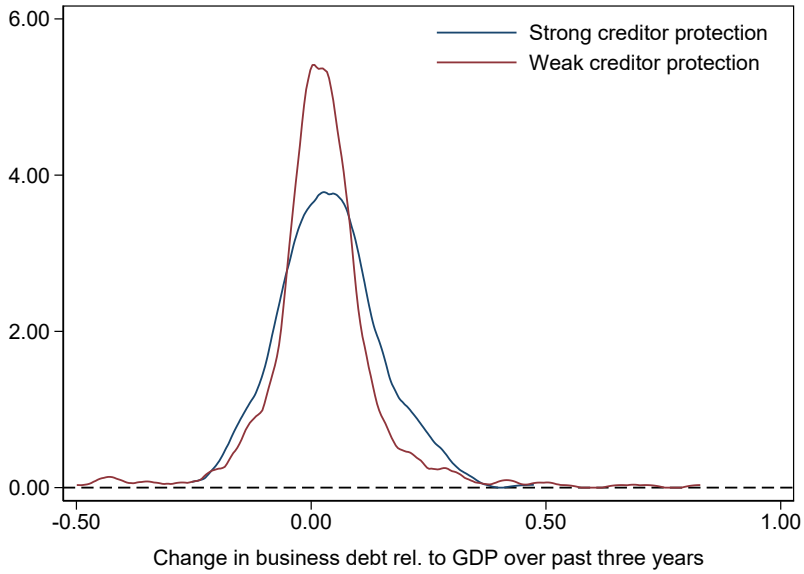
Does the nature of credit booms differ across creditor rights regimes? Table 3 documents systematic differences during credit booms across legal regimes. Credit booms under strong creditor rights are associated with substantially higher GDP growth (3.1 versus 1.8 percentage points) and investment rates. 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.15 explores the dynamics of these patterns. Panel A.15a 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.15b 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.

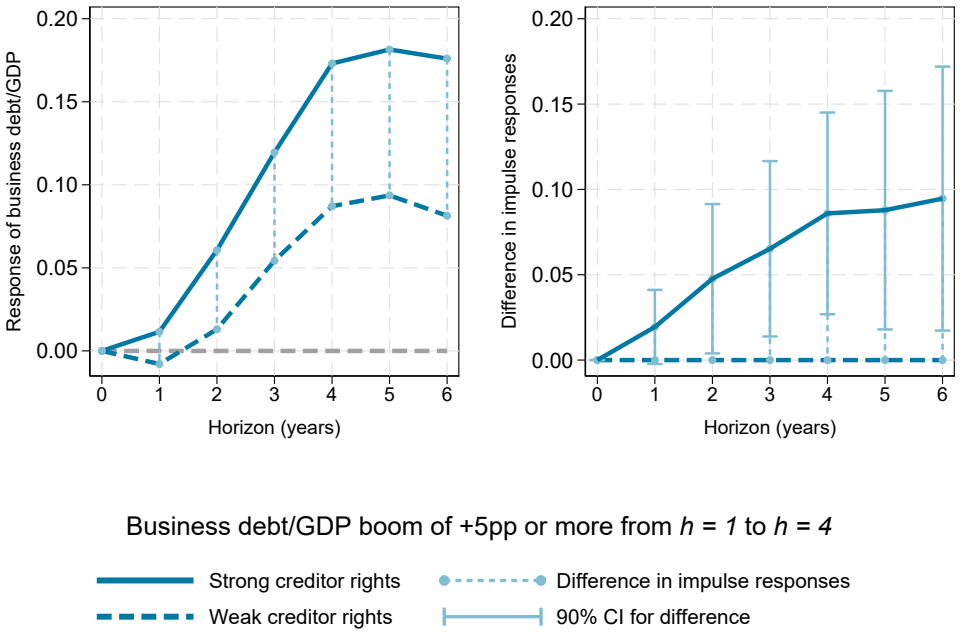
Figure 7: Credit Cyclicality and Creditor Rights



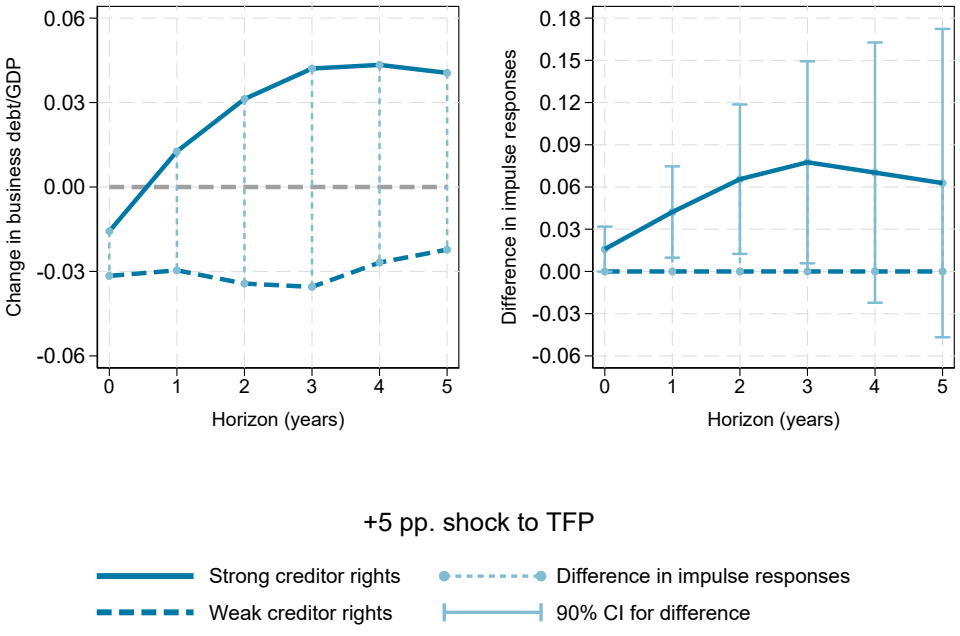
Notes: This figure shows the kernel density plot for the three year change in the business debt-to-GDP ratio in the country-year sample with strong (weak) creditor rights, $L_{i,t} = 1$ ($L_{i,t} = 0$).

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 (19). 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 macroprudential policy design. A growing literature motivates ex-ante interventions to restrict credit growth on the grounds that private agents do not internalize the systemic risks of leverage. Our evidence highlights an additional, institutional margin: stronger creditor rights are associated with more frequent and larger business credit booms, yet substantially attenuate their macroeconomic costs. Creditor rights thus interact with standard macroprudential tools by shaping the allocative efficiency of post-boom adjustment, not 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.

Asriyan, Vladimir, Luc Laeven, and Alberto Martín. 2021. "Collateral booms and information depletion." Review of Economic Studies, 89(2): 517–555.

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.

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.

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.

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.

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."

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

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, 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.

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

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

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

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.

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.

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]

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A Model of Credit Booms, Misallocation and Creditor Rights

A.1 Overview

The model illustrates, in a stylized manner, how a credit expansion fueled by potential productivity gains can lead to misallocation. Importantly, the model illustrates how strong creditor rights can attenuate such misallocation and associated output losses after the boom. The model helps to rationalize the empirical evidence of vibrant (muted) credit reallocation after credit booms under regimes of strong (weak) creditor rights, and links it to the observed resilience (sluggishness) of real output.

In broad strokes, the model describes a continuum of ex-ante identical firms with investment opportunities exceeding internal funding. Firms can access credit but suffer moral hazard. Productivity of investments is uncertain and ex post heterogeneous across firms. Unproductive firms will be shrunk in bankruptcy if forced by creditors. The model combines two basic channels through which legal protection of creditors improves capital allocation: First, stronger protection gives creditors greater power to shut down relatively unproductive firms ("liquidation channel"). Second, stronger protection eases financing constraints of deserving firms ("credit access channel").

Arguably, both channels also operate outside credit cycles. But they are particularly consequential when much investment is funded by credit, i.e., after a credit boom.

A.1.1 Exogenous variables

$f \in [0,1]$: Index for firms from continuum

$t \in \{0,1\}$: Index for discrete points in time

$a_f > 0$: Productivity of firm f in production at time 1

A.1.2 Endogenous variables

$k_f \geq 0$: Capital assets of firm f for production at time 1

$b_f \geq 0$: Debt of firm f due at time 1

$q_f \geq 0$: Price of firm f's debt at time 0

$\bar{b}_f \geq 0$: Credit constraint for firm f

A.1.3 Parameters

$\kappa \in [0,1]$: Share of bankrupt firms' value allotted to the bank ("creditor rights")

$\alpha \in (0,1)$: Curvature of firm production function

$\epsilon > 0$: Equity available for investment at each firm at time 0

$\bar{a} > 0$: Maximal firm productivity at time 1

A.2 Model assumptions

The model features a unit mass of firms run by owner-managers and a representative bank which is deep-pocketed and equity financed. All agents in the model share the same discount rate, which is normalized to zero without loss of generality. Bankruptcy procedures are perfectly efficient, but firm owner-managers are biased towards continuation in the sense of avoiding bankruptcy unless forced by creditors.[19]

At time 0, firms are identical and have internal equity funds ϵ available for investment k_f. Each firm also has access to bank credit b_f. Productivity at time 1 will be heterogeneously distributed across firms. The ex post distribution F with support $[0, \bar{a}]$ and finite first moment forms the common belief for each individual firm.

$$a_f \sim F \tag{21}$$

Ex-post restructuring When uncertainty about productivity resolves, firms may have to undergo bankruptcy—i.e., formal operational and financial restructuring. Bankruptcy shrinks the firm to its ex-post optimal scale at no cost and sells excess capital, generating

$$B(a_f, k_f) = a_f \tilde{k}^\alpha + (k_f - \tilde{k}) \tag{22}$$

$$\text{where} \quad \tilde{k} = \arg\max_{k \leq k_f} a_f k^\alpha - k \tag{23}$$

Resulting bankruptcy value $B(a_f, k_f)$ is split between the bank and firm owner-managers. The bank receives fraction κ, but never more than contractual debt claims:

$$B_b(a_f, k_f, b_f) = \min\left\{\kappa B(\cdot),\ b_f\right\} \tag{24}$$

[19] This assumption is consistent with private benefits of control.

Firm owner-managers receive residual value $B(\cdot) - B_b(\cdot)$. Importantly, the bank will force the firm into bankruptcy only when the bank's bankruptcy payoff is larger than what the firm can pay outside bankruptcy:

$$X(a_f, k_f, b_f) = \mathbb{1}\Big[a_f k_f^{\alpha} < B_b(\cdot)\Big] \tag{25}$$

Firm's problem Anticipating ex post restructuring outcomes at time 0, firms purchase capital k_f so as to maximize the expected equity payoffs. We assume firms to follow a pecking order of funds—internal cash, credit, equity issuance. For simplicity, equity issuance costs are assumed to be prohibitively large, translating into a non-negativity constraint for equity transfers. Importantly, we assume that contracting frictions make the price of debt q_f insensitive to changes in the investment choice. To contain the resulting moral hazard, creditors set a credit constraint $\bar{b}_f$.

$$\max_{k_f \geq 0} \epsilon - k_f + q_f b_f + \mathbb{E}\Big[\Big(1 - X(\cdot)\Big) \max\left\{a_f k_f^{\alpha} - b_f), 0\right\} + X(\cdot)\Big(B(\cdot) - B_b(\cdot)\Big)\Big] \tag{26}$$

s.t.

$$\epsilon \geq \epsilon - k_f + q_f b_f \geq 0 \tag{27}$$

$$b_f \leq \bar{b}_f \tag{28}$$

We assume that the expected productivity shock $\mathbb{E}[a_f]$ is large enough relative to internal funds ϵ, such that $b_f = k_f - \epsilon$ at the optimum.

Bank's problem We assume that the bank sets credit constraints $\bar{b}_f$ to avoid losses even under the worst possible ex post scenario $a_f = 0$. We further assume that the bank prices debt competitively, i.e., equating it with the expected value of a unit debt. Hence, the bank sets

$$\bar{b}_f = \kappa B\Big(0, k_f^*(\bar{b}_f, q_f)\Big) = \kappa k_f^*(\bar{b}_f) \tag{29}$$

$$q_f = 1 \; \forall f \tag{30}$$

Planner's problem The planner can invest without financial frictions: There is no moral hazard, equity can be issued freely and firms will be restructured ex post whenever $a_f k_f^{\alpha} < B(a_f, k_f)$, i.e., irrespective of default requirements or value split between creditors and bor-

rowers. The planner's problem thus reads:

$$\max_{k_f \geq 0} -k_f + \mathbb{E}\Big[\max\{a_f k_f^{\alpha}, B(a_f, k_f)\}\Big] \tag{31}$$

A.3 Model implications

A.3.1 Analytical solution

Because firms are ex ante identical and exposed to the same future possibilities, all firms face the same credit constraint, and invest and borrow the same amount. Hence, firm indices f will be dropped in the following except for productivity a_f.

Maintaining the assumption that expected future productivity is large enough relative to ϵ, credit demand is positive and the credit constraint binds for sufficiently small κ.[20] When the credit constraint binds, investment is $k^*(\bar{b}) = \bar{b} - \epsilon$. Plugging this into (29) and rearranging yields

$$\bar{b} = \frac{\kappa}{1-\kappa}\epsilon \tag{32}$$

Hence, under binding credit constraints the laissez-faire optimal investment and the bankruptcy condition become

$$k^* = \frac{\epsilon}{1-\kappa} \tag{33}$$

$$X(a, k^*, \bar{b}) = \mathbb{1}\Big[a_f < \kappa\Big(\frac{\epsilon}{1-\kappa}\Big)^{1-\alpha}\Big] \tag{34}$$

Derivatives with respect to κ of investment as well as productivity bankruptcy threshold are strictly positive within its domain. Two lemmas follow from that:

Lemma A.1 (Credit Access Channel)**.** *When credit constraints matter, investment monotonically increases in κ.*

Lemma A.2 (Liquidation Channel)**.** *When credit constraints matter, the share of firms liquidating assets monotonically increases in κ.*

Lemma 1 implies that higher κ increases aggregate capital before liquidations. Lemma 2 implies that higher κ increases the prevalence of efficient liquidations. Jointly, this implies that higher κ decreases misallocation and increases output ex post. Precise quantities will depend on the functional form of F, also see next subsection.

[20] This is because $\bar{b}|_{\kappa=0} = 0$ as per (29).

To understand behavior of unconstrained firms, it is instructive to start with the planner's problem. The planner would like to restructure all firms ex post, because restructuring carries no deadweight cost and is yields *individually* efficient firm sizes ex post. Since restructuring, however, can only *downsize* firms in this model, initial investment has to be sufficiently large for all firms. Thus, the planner objective reaches its maximum at $k^*_{\text{Planner}} = (\bar{a}\alpha)^{\frac{1}{1-\alpha}}$ as well as at any level above that.

In the *laissez-faire* economy where credit constraints do not bind (e.g., under $\kappa = 1$), the firm looses its funding constraint—like in the planner's problem—but will enter bankruptcy only when debt would otherwise be impaired—unlike in the planner's problem. That is, choosing k^*_{Planner} would leave some highly productive firms with too much capital and without restructuring. To always impair debt ex post (to trigger bankruptcy), the unconstrained firm would thus choose a level of investment $k^*_{\text{free}} > k^*_{\text{Planner}}$, satisfying $\bar{a}{k^*_{\text{free}}}^{\alpha} = k^*_{\text{free}} - \epsilon$.[21]

A.3.2 Numerical simulation

To illustrate precise comparative statics of aggregate output and misallocation with respect to κ, we need to assume a functional form for F. Specifically, we assume a symmetric bell-shaped Beta distribution, scaled to cover over the interval $[0, \bar{a}]$:

$$\frac{a_f}{\bar{a}} \sim B(4,4) \tag{35}$$

Moreover, we set $\bar{a} = 1$, $\alpha = 2/3$ and $\epsilon = 0.02$ and contrast model solutions for $\kappa \in \{0.6, 0.8\}$.[22]

Figure A.1 illustrates how the distribution of firm size and marginal products of capital (MPK) differ between the two calibrations. Stronger creditor rights align the allocation of capital more closely with the first best as creditors force more firms to liquidate assets ex post and shrink to their efficient size (liquidation channel). Moreover, stronger creditor rights increase the size of more productive firms by relaxing credit constraints (credit access channel). Both effects compress the distribution of MPKs. Stronger creditor rights i) limit the mass of firms with

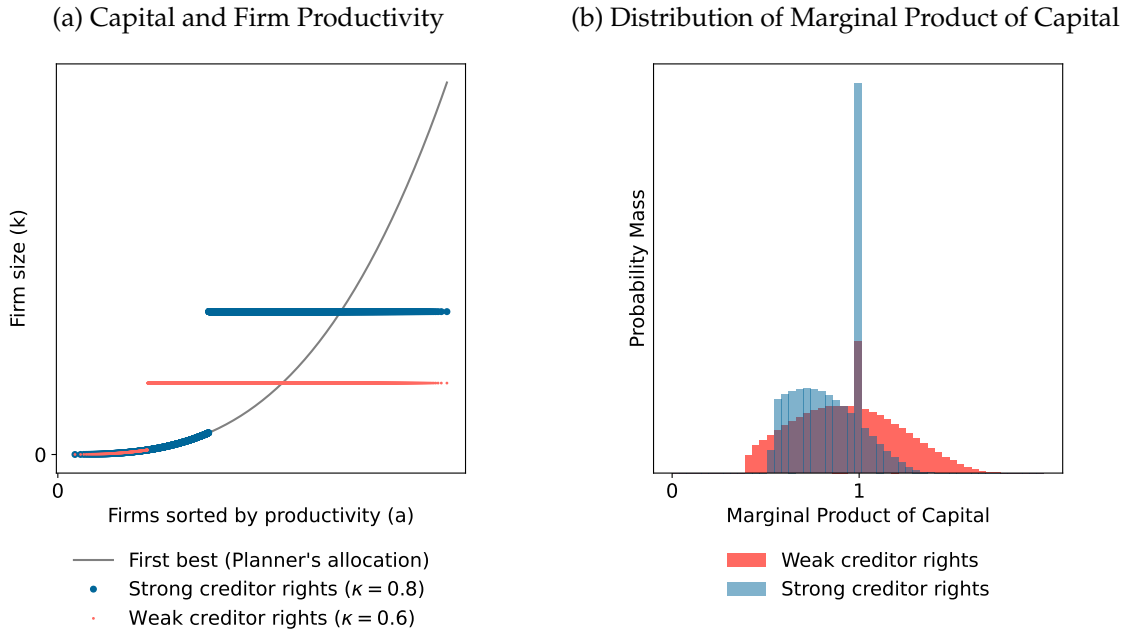
[21] The overinvestment of unconstrained firms relative to the planner's solution is an artifact of simplified modeling of the firm's continuation bias. We assume that bankruptcies are only initiated by creditors. We motivate this assumption by private benefits of control of firm owner-managers. Hence, a more explicit modeling approach would include a positive utility term in the firms problem outside bankruptcy. Under such a model, the unconstrained firm would *not* seek to maximize bankruptcies ex post.

[22] Results are qualitatively identical when choosing other reference points for κ as long as firms remain credit constrained. Moreover, parameter values guarantee $\arg\max_k \mathbb{E}[a_f]k^{\alpha} > \epsilon$; or equivalently expected marginal product of capital at $k = \epsilon$ to be greater than one, $\mathbb{E}[a_f]\alpha\epsilon^{\alpha-1} > 1$.

very high MPKs (credit access channel) while ii) moving firms with low capital productivity to an efficient MPK of 1 (liquidation channel).

How do the allocative effects change aggregate output? Figure A.2 compares the aggregate economic value in the model at time 1 between both calibrations, and decomposes the relative importance of the liquidation and credit access channels.[23] Total value obtains as the aggregate of i) firm's production output plus ii) value from efficiently liquidated capital. We compute those aggregates for each calibration and visualize them in the left panel of the figure. Moreover, changes in (i) across calibrations can be attributed to relaxation of financing constraints. Changes in the (ii) can be attributed to the liquidation channel. We compute those changes as well and sum them to decompose the difference in total aggregate value across calibrations, shown in the left panel. Overall, both channel are quantitatively relevant, with the liquidation change gaining in importance in this model for higher levels of creditor protection.

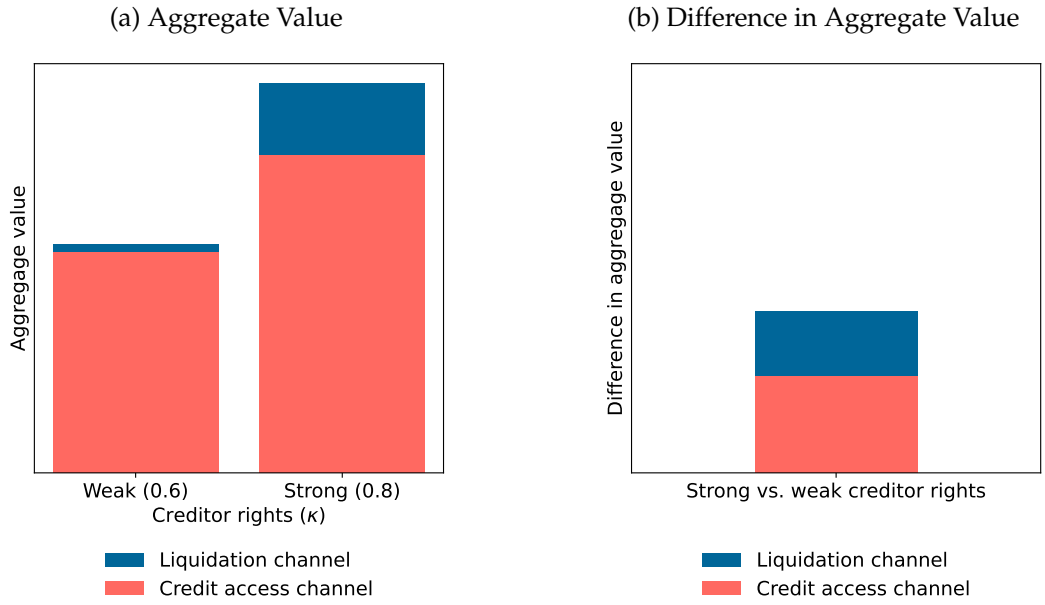
Figure A.1: Firm Capital Allocation under Strong and Weak Creditor Rights



Notes: This figure illustrates the ex post allocation of capital across firms and how the model generates misallocation. The left panel plots the capital of each firm indexed by ex post productivity after potential liquidations took place. The right panel posts the resulting dispersion of marginal products of capital. Model solution under relatively strong creditor rights ($\kappa = 0.8$) is shown in blue. Model solution under relatively strong creditor rights ($\kappa = 0.6$) is shown in red.

[23] Both channels interact: More investment is possible *because* of the prospect of more efficient liquidations. So alternative defensible compositions of aggregate effects between both channels are conceivable.

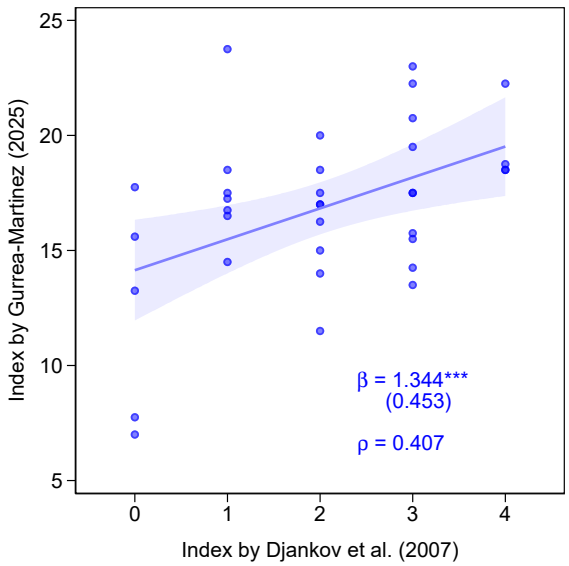
Figure A.2: Composition of Aggregate Value at under Strong and Weak Creditor Rights



Notes: This figure compares the aggregate value in the economy at time 1 across legal regimes and decomposes it into components links to the two effects highlighted in Lemma 1 and Lemma 2. The left panel shows the aggregate value in levels under weak ($\kappa = 0.6$) and strong ($\kappa = 0.8$) creditor rights. The right panel shows the difference between those levels. Portions colored blue are due the value from efficiently liquidated capital.

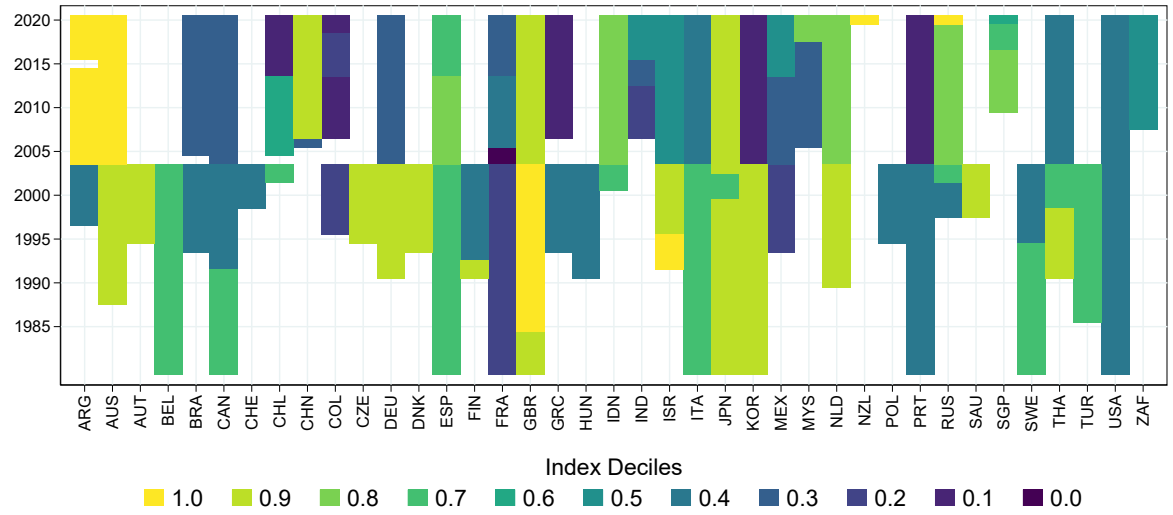
B Data Description

Figure A.3: 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.4: 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.

C Full Baseline Local Projection Estimates

Table A.2: Estimates of Local Projection Using Equation (15)

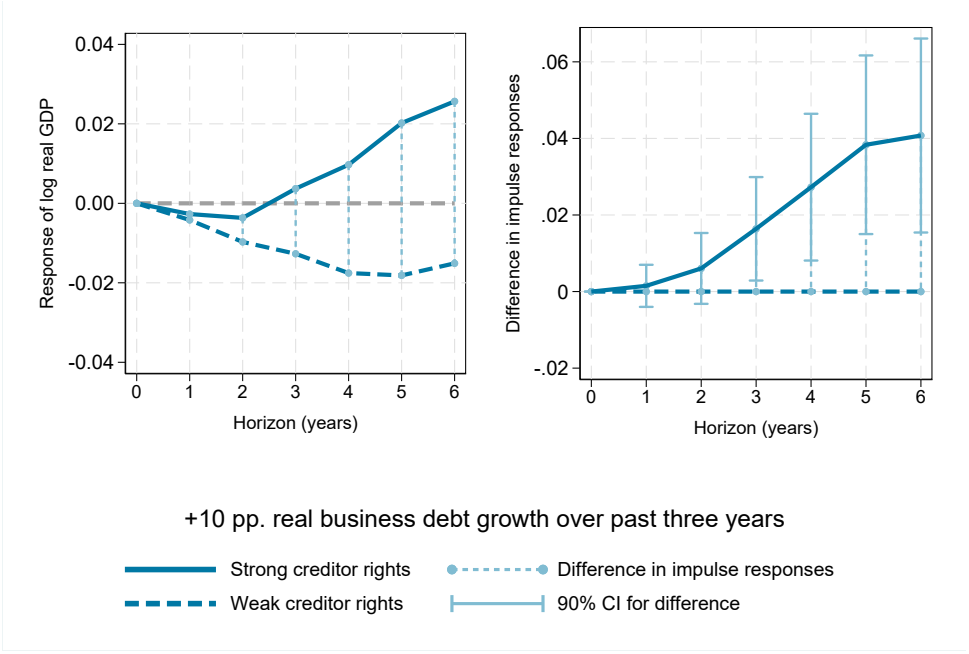
	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$
Δ_3Business total debt rel. to GDP (decimal) × Creditor rights index (percentile)	0.058	0.186**	0.392***	0.508***	0.575***
	(0.041)	(0.074)	(0.085)	(0.106)	(0.120)
Δ_3 Business credit/GDP	-0.091**	-0.211***	-0.373***	-0.452***	-0.464***
	(0.037)	(0.065)	(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 (15). Discroll-Kraay standard errors in parenthesis. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

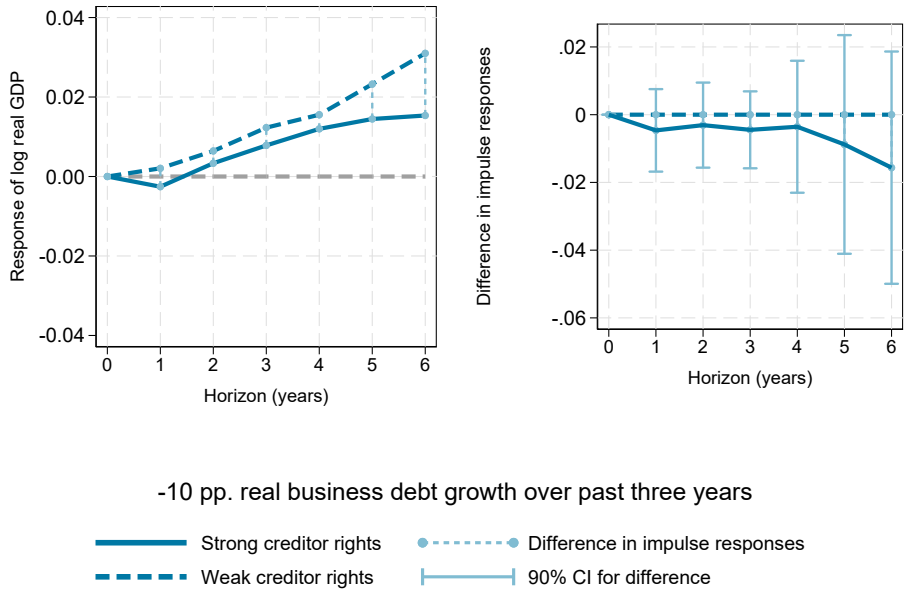
D Robustness of Local Projection Results

Figure A.5: Creditor Rights and Real GDP after Business Credit Expansions and Contractions

(a) Credit Expansion



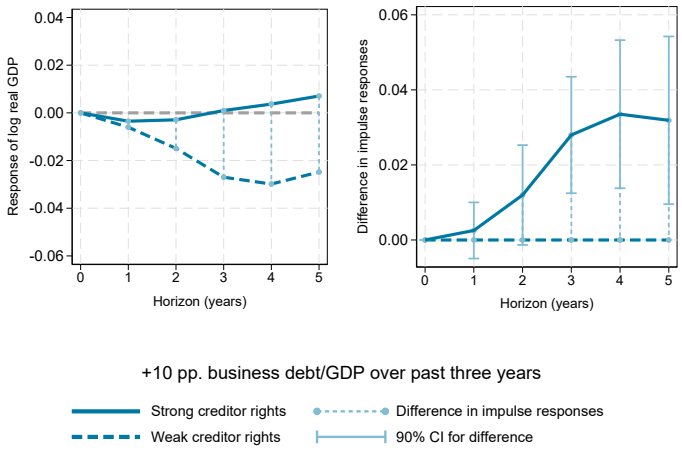
(b) Credit Contraction



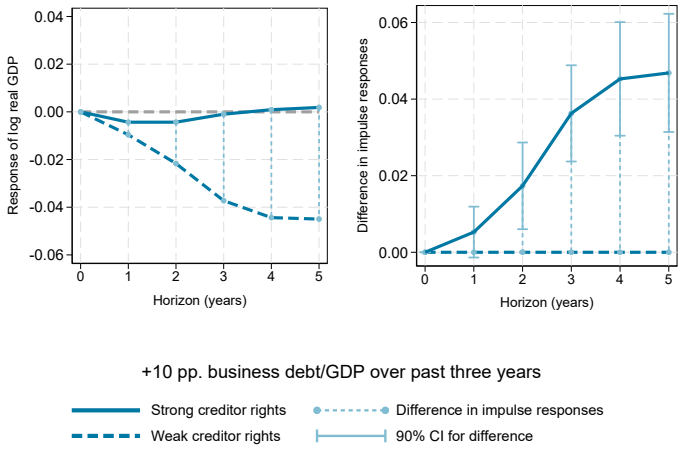
Notes: This figure visualizes estimates from state-dependent local projections with sign asymmetry in the spirit of Ben Zeev et al. (2023): $\Delta_h \log(\text{real GDP}_{i,t+h}) = \alpha_{i,h} + \beta_{1,h}\Delta_3 C_{i,t} + \beta_{2,h}\left(\Delta_3 C_{i,t} \times R_{i,t}\right) + \beta_{3,h} C_{i,t} + \boldsymbol{\gamma}_h \boldsymbol{x}_{i,t} + \Delta^+\left[\beta^+_{1,h} R_{i,t} + \beta^+_{2,h}\Delta_3 C_{i,t} + \beta^+_{3,h}\left(\Delta_3 C_{i,t} \times R_{i,t}\right) + \boldsymbol{\gamma}^+_h \boldsymbol{x}_{i,t}\right] + \epsilon_{i,t}$ 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.6: Creditor Rights and Real GDP after Business Credit Booms: Institutional Controls

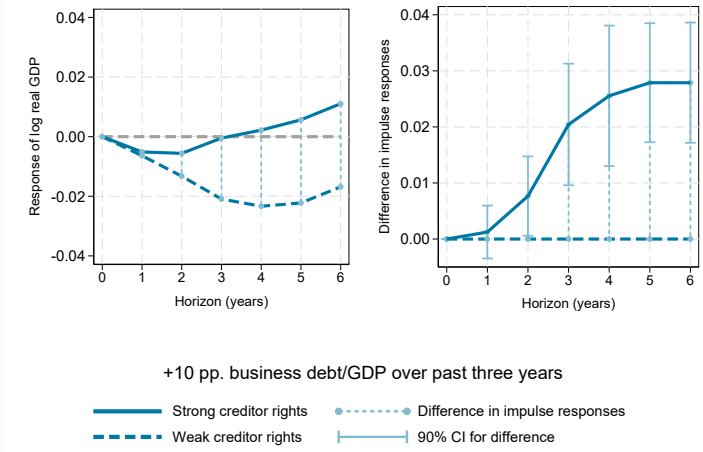
(a) Controlling for Economic Development



(b) Controlling for Financial Development



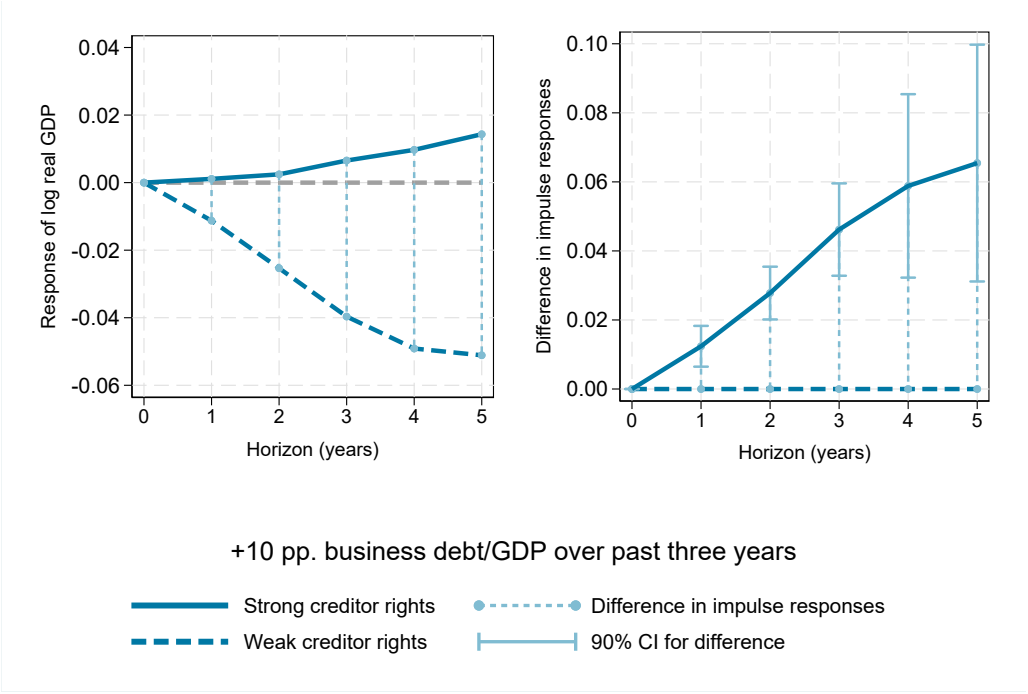
(c) Controlling for Bankruptcy Efficiency



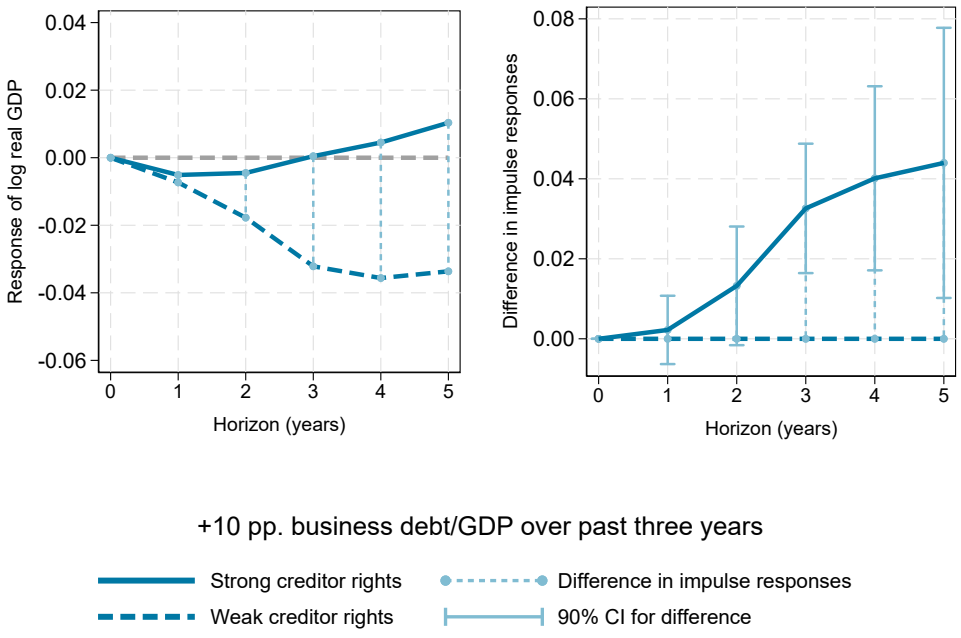
Notes: This figure visualizes estimates from the local projection equation (15) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for log GDP in real US Dollar and its interaction with $\Delta_3 c_{i,t}$. Panel (b) controls for the 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.7: Creditor Rights and Real GDP after Business Credit Booms: Advanced and Emerging Economies

(a) Advanced Economies

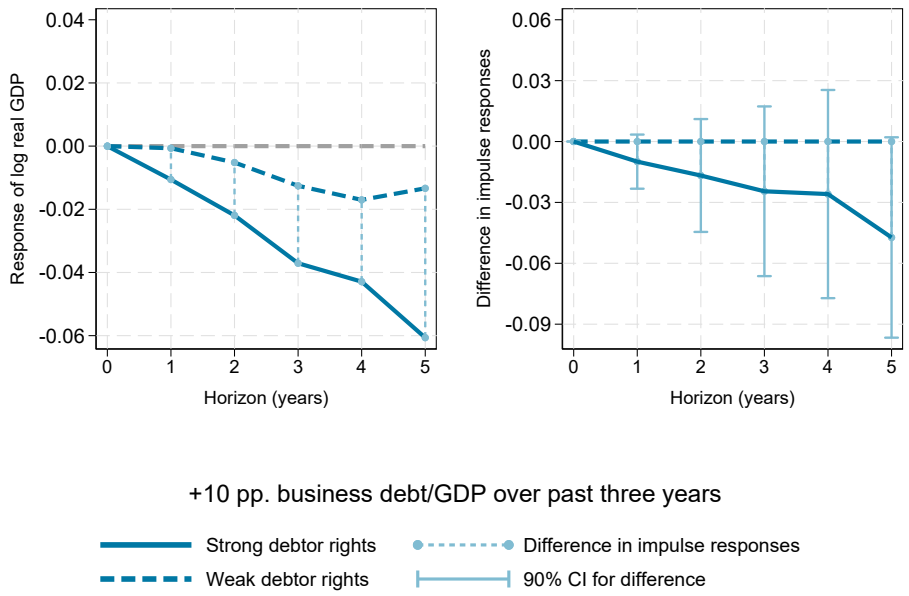


(b) Emerging Economies



Notes: This figure visualizes estimates from the local projection equation (15) 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 (15) obtained in the subsample of advanced economies. Panel (b) shows estimates of Equation (15) 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.

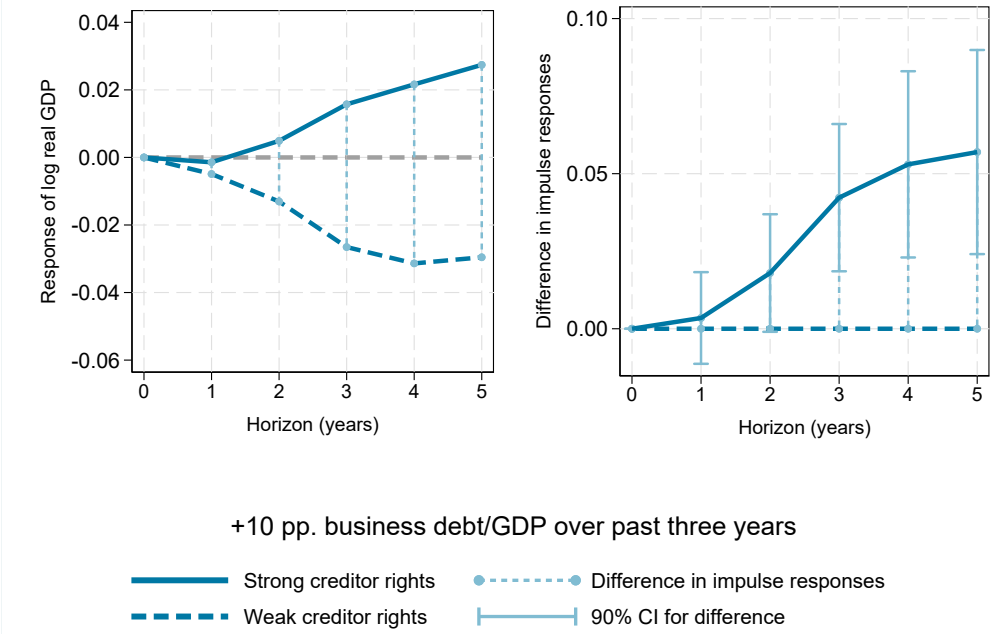
Figure A.8: Debtor Rights and Real GDP After Business Credit Booms



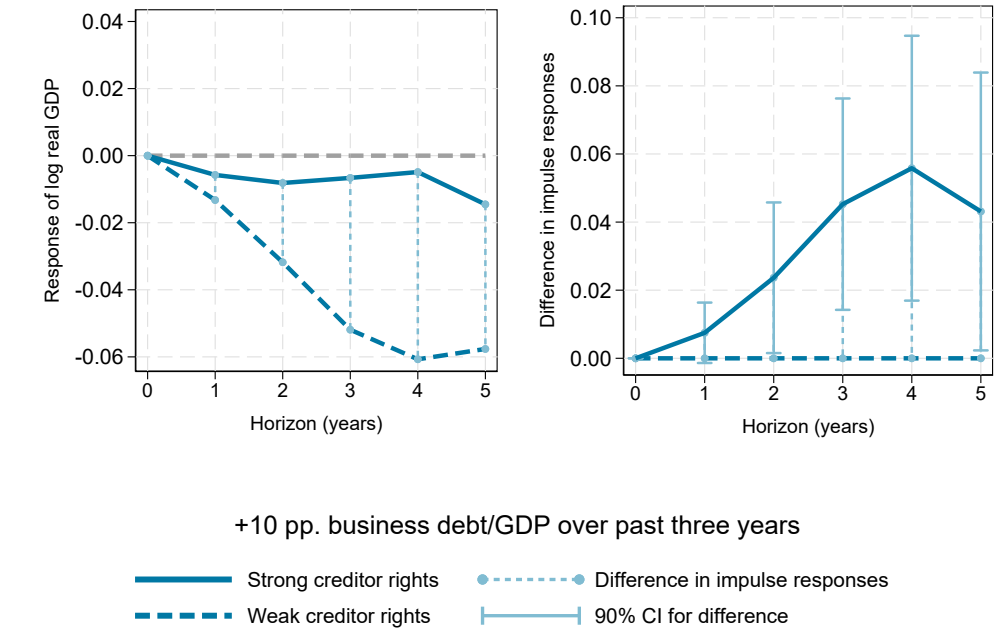
Notes: This figure visualizes estimates from the local projection equation (15) but replacing $L_{i,t}$ by the index of *debtor* friendliness from Gurrea-Martinez (2025). The right panel plots the impulse response in real GDP to a 10 percentage points increase in the business debt to GDP ratio over the 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.9: Creditor Rights and Real GDP after Business Credit Booms: Other Measures

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



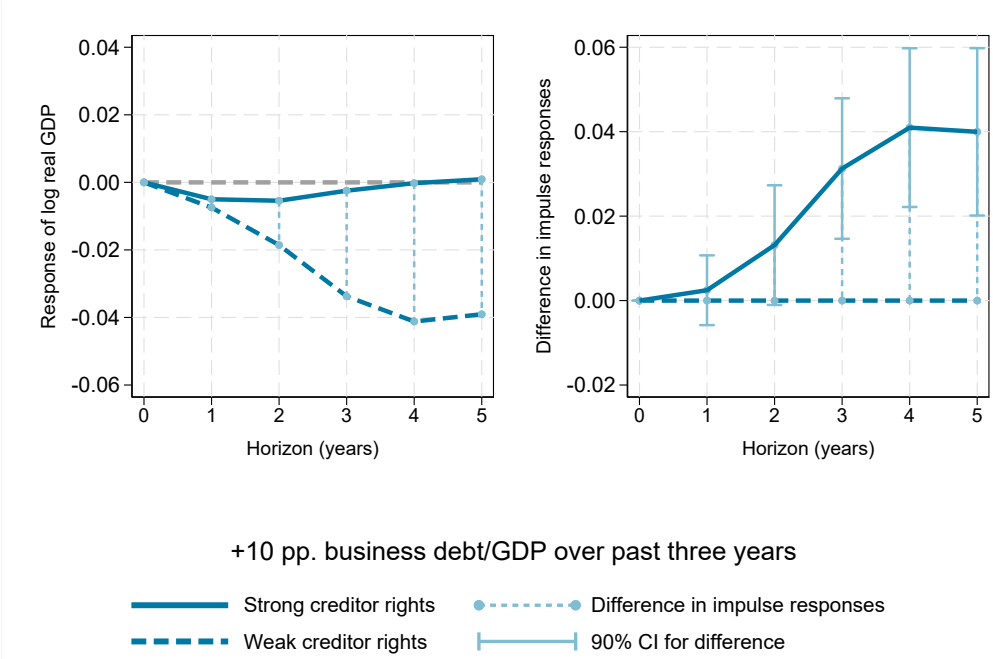
(b) Index and subsample of Gurrea-Martinez (2025)



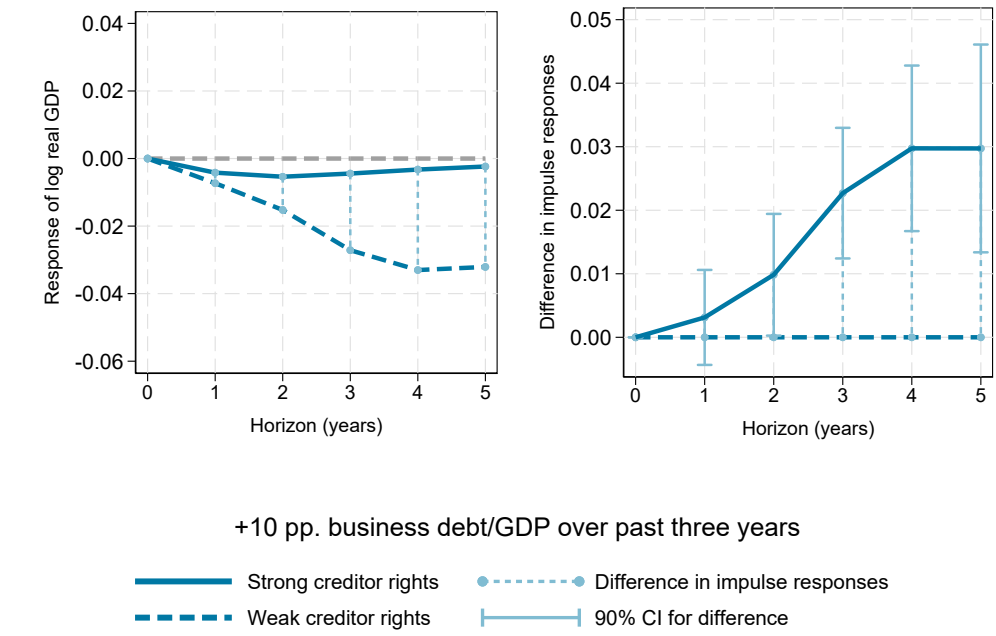
Notes: This figure visualizes estimates from the local projection equation (15) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates using only the index of Djankov et al. (2007). Panel (b) shows estimates using only the index 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.10: Creditor Rights and Real GDP after Business Credit Booms: Alternative Gurrea-Martinez (2025) Indices

(a) Index Based on Weakest Protection for Secured Creditors



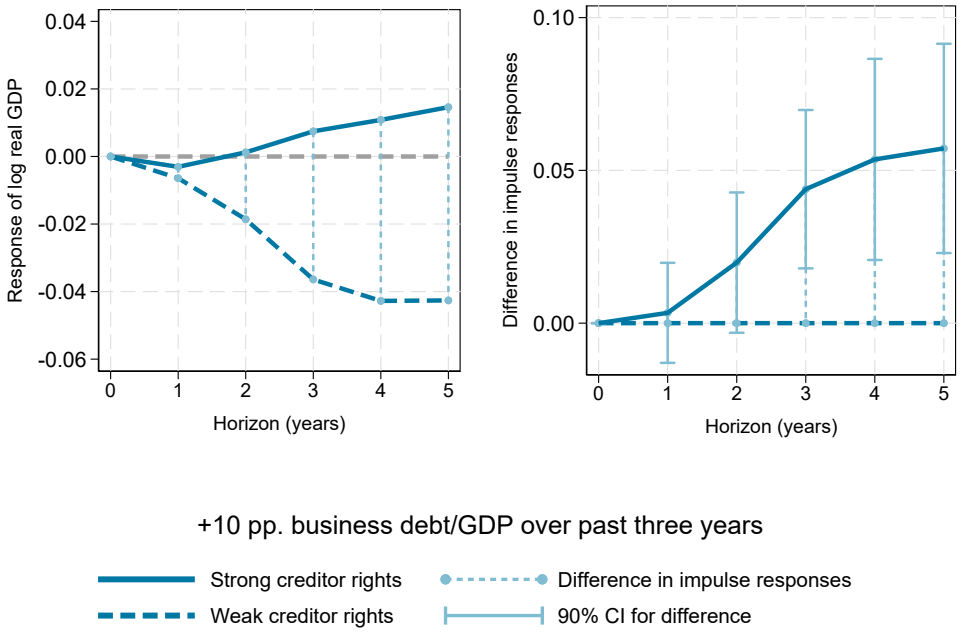
(b) Index Based on Strongest Protection for Secured Creditors



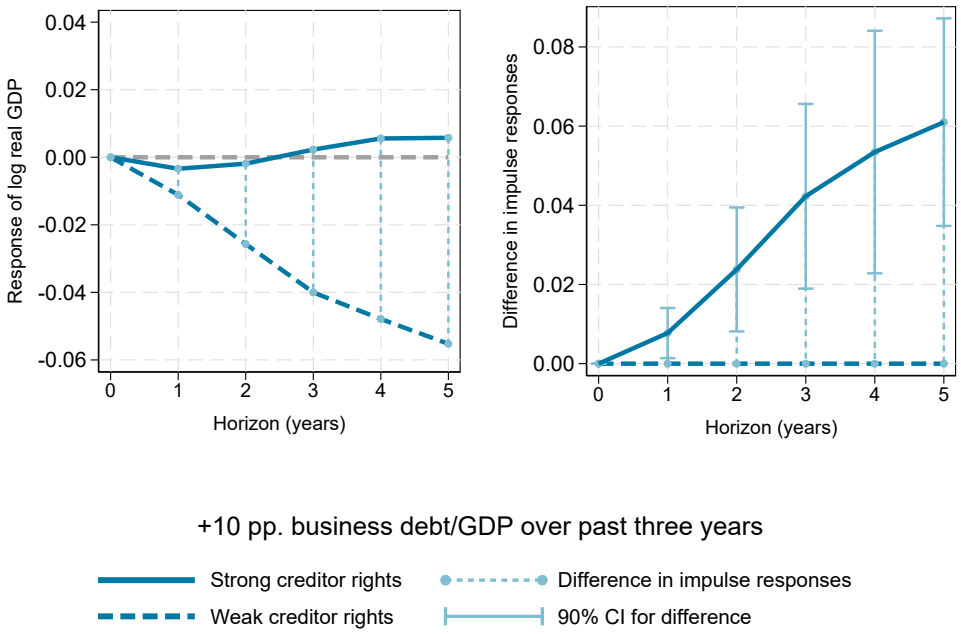
Notes: This figure reports estimates from the local projection equation (15), based on a 10 percentage point increase in the business debt-to-GDP ratio over the preceding three years. When multiple bankruptcy procedures are available in a given country-year, we select alternative indices from Gurrea-Martinez (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.11: Creditor Rights and Real GDP after Business Credit Booms: Pre- and Post-2003

(a) Before 2003



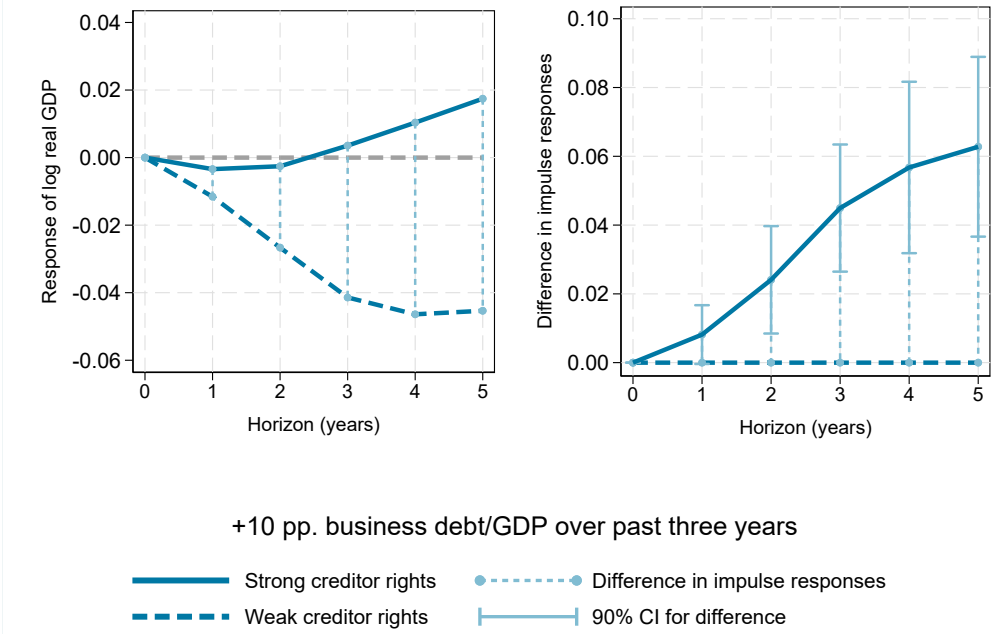
(b) After 2003



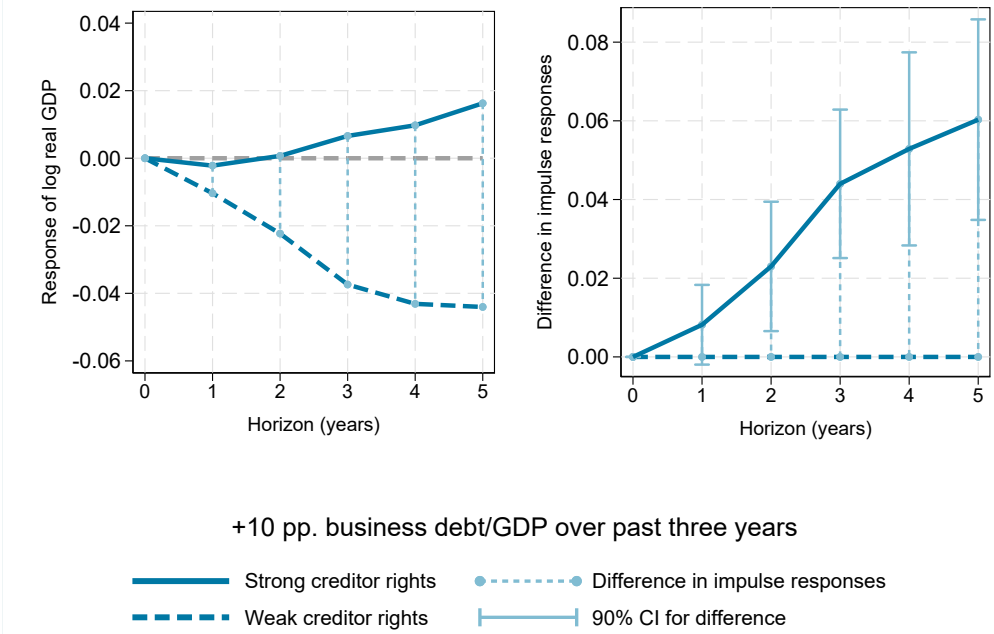
Notes: This figure visualizes estimates from the local projection equation (15) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates of Equation (15) obtained in the subsample running up until and including 2003 – the median year in our sample. Panel (b) shows estimates of Equation (15) 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.12: Creditor Rights and Real GDP, Controlling For Boom Characteristics

(a) Real Estate Debt Share



(b) High Yield Share

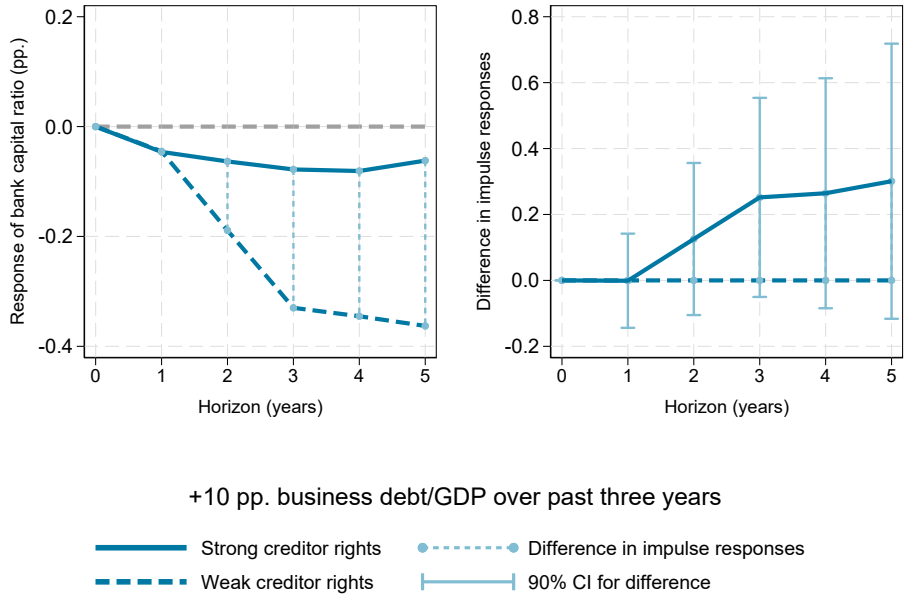


Notes: This figure visualizes estimates from the local projection equation (15) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for the share of credit to real estate and construction and its interaction with $\Delta_3 c_{i,t}$. 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.

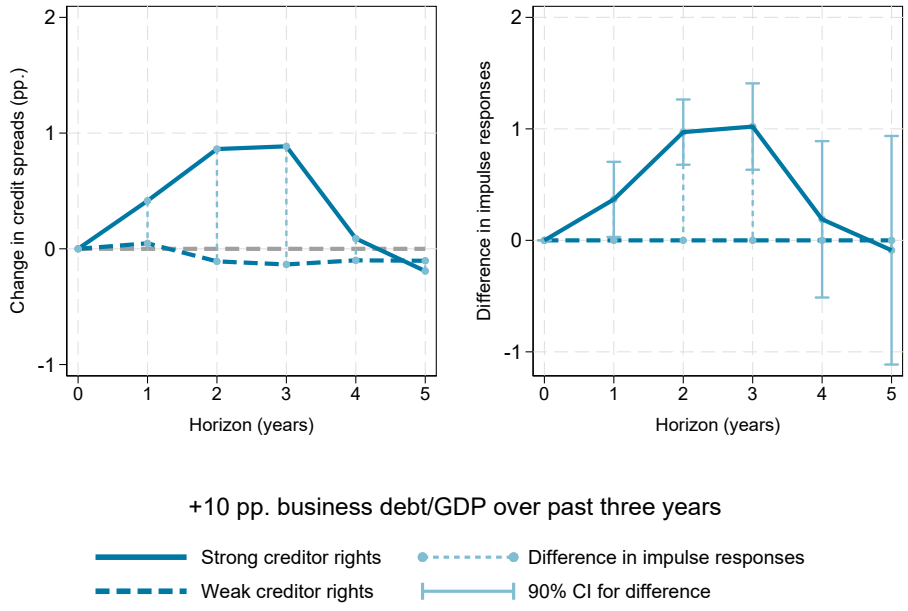
E Additional Local Projection Results

Figure A.13: Creditor Rights, Bank Capital, and Credit Risk Pricing

(a) Bank Capital Ratio



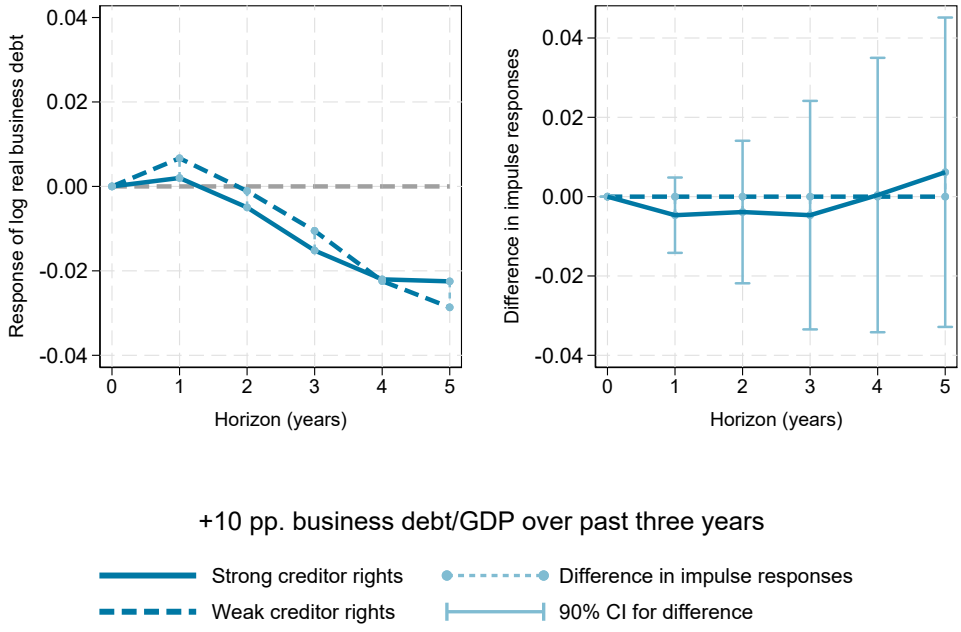
(b) Credit Spreads



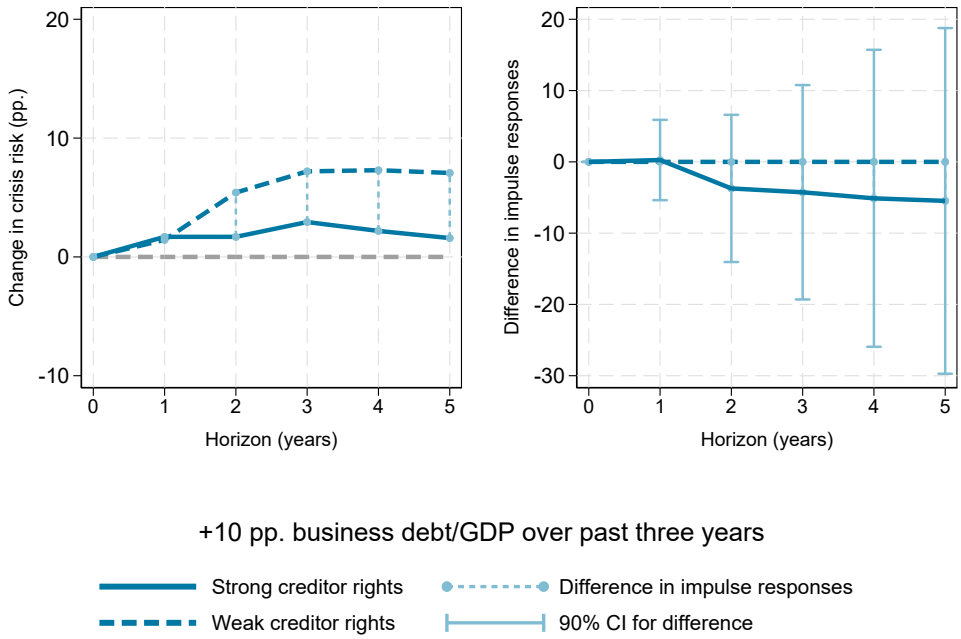
Notes: These figures visualize estimates from the local projections from equation (15). Panel (a) plots the response of the bank capital ratio (bank capital divided by total assets). Panel (b) plots the response of the spread between yields on long-term corporate and government bonds. We show the response 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.14: Creditor Rights, Deleveraging, and Crises

(a) Log Real Business Debt



(b) Financial Crisis Risk

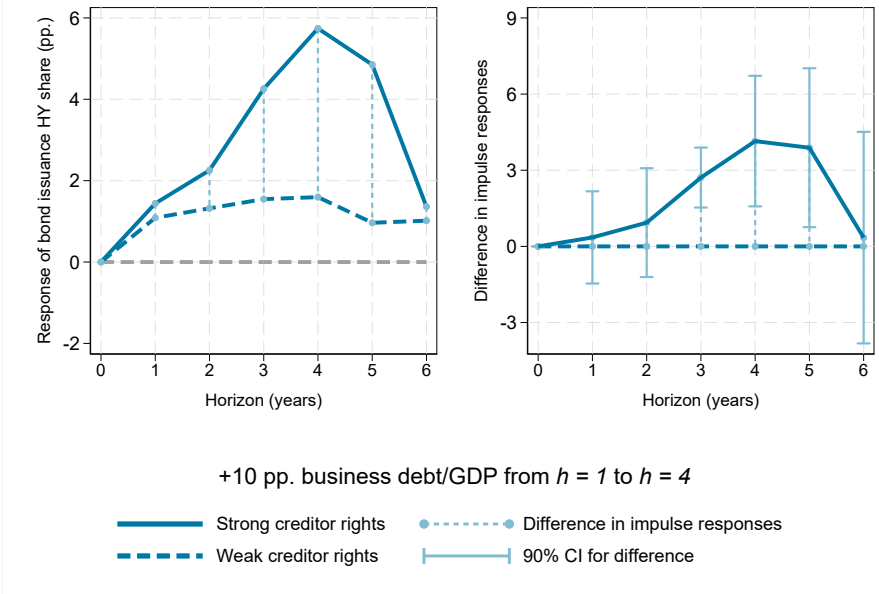


Notes: This figure shows impulse response estimates from local projections following a 10 percentage point increase in the business debt-to-GDP ratio over three years. Panel (a) shows predicted cumulative changes in log real business debt. Panel (b) shows predicted cumulative changes in the probability 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.

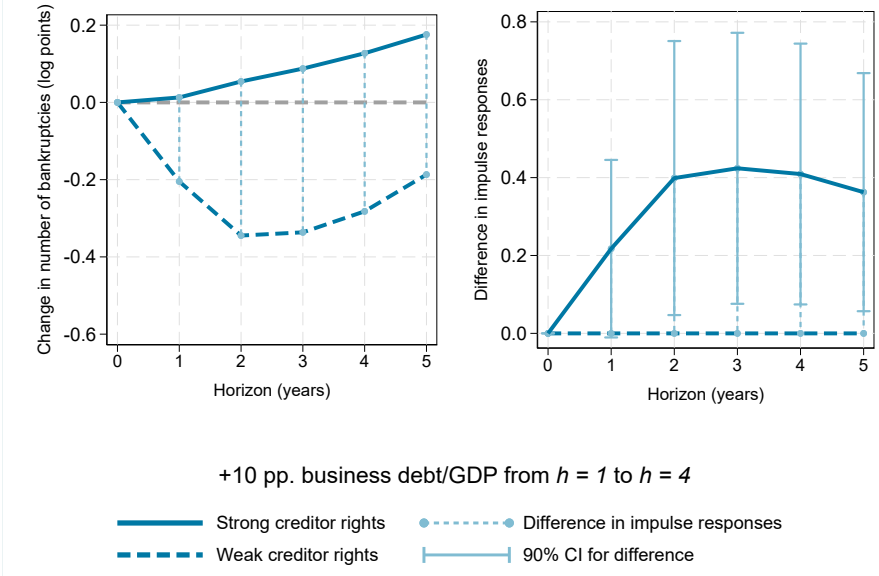
F Differences in Credit Boom Characteristics

Figure A.15: Creditor Rights and the Nature of Business Credit Booms

(a) Risky Firms Debt Share



(b) Bankruptcy Filings



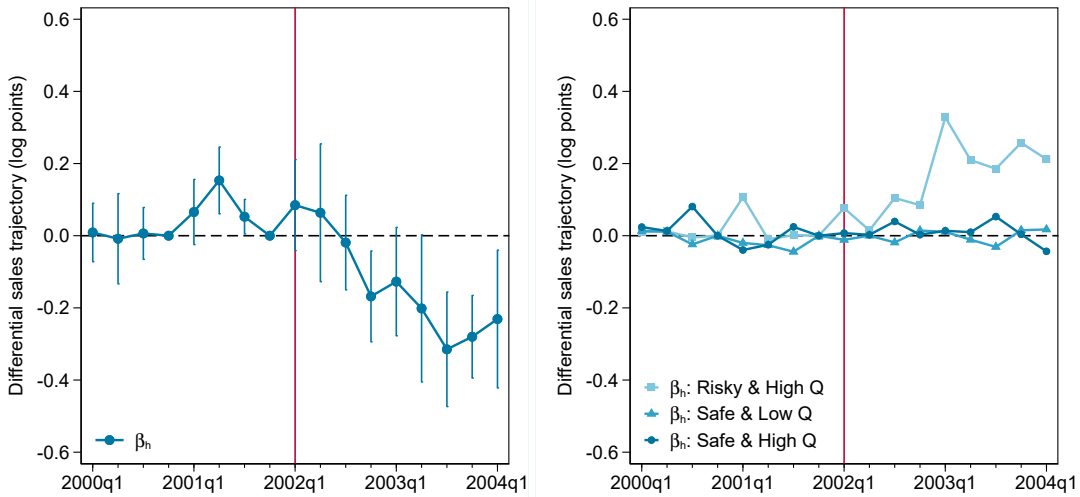
Notes: These figures visualize estimates from local projections as in equation (19) following a 10 percentage points increase in the business debt to GDP ratio over *future* three years, which captures contemporaneous dynamics during the boom. Panel (a) presents the response of the share of annual bond 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.

G Additional Results From US Legal Reforms

Figure A.16: 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 (16) 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

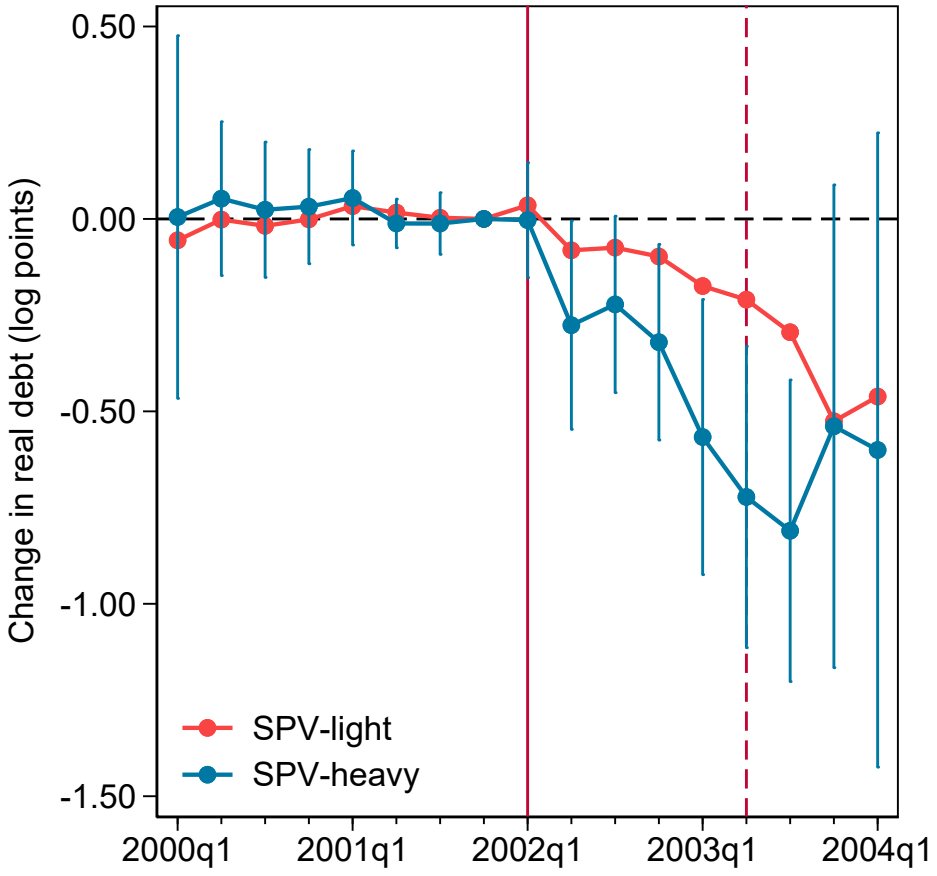
	(1) Baseline	(2) z-score	(3) Excl. Delaware
Low Q × High risk × Strong creditors	-0.165***	-0.117**	-0.342***
	(0.028)	(0.044)	(0.098)
Low Q × High risk	0.025**	-0.016	0.021
	(0.012)	(0.019)	(0.045)
Low Q × Strong creditors	0.053*	-0.021	0.066*
	(0.029)	(0.020)	(0.037)
High risk × Strong creditors	0.081**	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 18 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.17: 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 (16) 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 $\mathbb{1}(\text{SPV-heavy})$.