Credit Cycles and Creditor Rights*

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Abstract

Do creditor rights amplify or dampen economic fluctuations? 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 unproductive sectors. Firm-level evidence from Delaware's adoption of antirecharacterization laws shows that well-protected creditors cut credit to low-productivity firms while easing borrowing constraints for productive ones. Overall, our findings indicate that stronger creditor rights dampen the output losses of credit booms by facilitating a more efficient reallocation of capital.

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1 Introduction

Economic downturns often come on the heels of an expansion of private debt (e.g., Kindleberger, 1978; Minsky, 1977; Reinhart and Rogoff, 2011; Schularick and Taylor, 2012; Greenwood et al., 2022; Müller and Verner, 2024). These episodes are often marked by conflicts between creditors and borrowers over the distribution of losses. The resolution of these conflicts depends on the legal framework governing creditor-debtor relations, notably the strength of creditor rights.

Prior work shows that stronger creditor rights increase credit supply by affecting recovery rates and moral hazard among borrowers (La Porta et al., 1998; Djankov et al., 2007; Qian and Strahan, 2007; Bae and Goyal, 2009; Benmelech and Bergman, 2011). At the same time, excessive creditor power can lead to inefficient liquidations and discourage productive entrepreneurial activity by raising the cost of failure (Acharya and Subramanian, 2009; Acharya et al., 2011; Vig, 2013; Kornejew, 2025). While this literature has focused on steady-state outcomes, less is known about the relationship between creditor rights and business cycle dynamics. This paper examines whether creditor rights mitigate or amplify the macroeconomic risks of credit booms.

We highlight two competing hypotheses. The *amplification view* predicts that strong creditor rights exacerbate boom–bust cycles by fueling credit expansion during upswings and triggering aggressive liquidations that generate externalities during downturns. This view is emphasized in studies of household debt resolution in the United States (Mian et al., 2015; Auclert et al., 2019; Auclert and Mitman, 2023). The *dampening view*, by contrast, argues that strong creditors are better positioned to withdraw credit from overleveraged borrowers while easing borrowing constraints for others, thereby improving the allocation of credit. This mechanism may be especially relevant in the corporate sector, where most defaults occur during downturns (Ivashina et al., 2024) and where liquidation can facilitate the reallocation of capital and labor toward more productive firms (Antill and Clayton, 2025). The key distinction is that foreclosing on indebted households may destroy value and propagate fire sales, whereas corporate restructuring and liquidation can redeploy resources to more productive uses. These competing views yield distinct empirical predictions, which we test using cross-country panel data and a natural experiment coupled with U.S. firm-level data. Across both settings, we find support for the dampening view: stronger creditor rights are associated with milder, not deeper, economic contractions.

Our analysis proceeds in three steps. First, we compile a new cross-country dataset cover-

ing 39 countries from 1978 through 2019 that combines corporate creditor rights indices (Djankov et al., 2007; Gurrea-Martinez, 2025; Albertus et al., 2026) with data on macroeconomic outcomes and various credit market measures. We establish a new empirical fact: business credit booms are followed by significantly better GDP outcomes in countries with strong creditor rights. This pattern is economically large. A ten percentage point increase in the business debt-to-GDP ratio over three years predicts a decline in real GDP of four to five percentage points over the next five years in countries with the weakest creditor protections. In contrast, economies with strong creditor rights experience a limited economic downturn. These patterns are robust to controlling for the level of economic and financial development, the quality of bankruptcy institutions, and the nature of the credit boom. They hold in both advanced and emerging economies and in different time periods.

Second, we examine the mechanisms underlying these findings. A key pattern is that, where creditor rights are weak, credit remains tied to distressed borrowers rather than being redirected to more productive uses. Following a credit expansion, weak creditor rights are associated with limited credit reallocation across sectors, credit growth concentrated in sectors with the weakest productivity growth, and continued borrowing by risky firms at compressed spreads. Nonperforming loans accumulate and banks' market capitalization erodes, as banks face losses from their loans to distressed borrowers. By contrast, economies with strong creditor rights exhibit an increase in credit reallocation, a widening of credit spreads, and a diversion of credit away from unproductive sectors and risky firms. Together, these results suggest that creditor rights shape the aftermath of credit booms by determining whether credit remains tied up with firms in distress or is redirected toward more productive uses.

We then turn to US micro data to test the idea that creditor rights have a causal effect by facilitating the reallocation of capital. Specifically, we study state-level antirecharacterization laws that gave secured creditors faster, more certain access to collateral pledged through special purpose vehicles (SPVs) when a borrower defaults (Li et al., 2016; Mann, 2018; Chu, 2020; Ersahin, 2020; Vats, 2020; Favara et al., 2021; Tut, 2019). We focus on Delaware's reform which took effect in January 2002, immediately after the corporate credit boom associated with the Dotcom bubble. This timing isolates the effect of creditor rights on the aftermath of the boom: Delaware firms accumulated debt under the same regime of creditor rights as firms elsewhere, implying that any subsequent differential outcomes reflect the role of creditor rights in resolving distress rather than in shap-

ing the boom itself. We combine the reform with novel, hand-collected data on firms' reliance on SPVs, matched to quarterly balance sheet information from Compustat.

We compare debt growth between firms incorporated in Delaware and those incorporated in non-adopting states, with fixed effects absorbing time-invariant firm characteristics and sector-specific dynamics. To test for a role of changes in misallocation, we examine how the reform's effect on debt varies with firms' pre-reform marginal revenue product of capital (MRPK) (Hsieh and Klenow, 2009), a standard proxy for productivity, in an approach akin to Bau and Matray (2023). Following the reform, low-MRPK Delaware firms reduce debt relative to similarly unproductive firms in non-adopting states, while high-MRPK Delaware firms experience significantly stronger debt growth than their equally productive counterparts elsewhere. These effects are concentrated among riskier firms for which financial distress, and thus the relevance of creditor rights, is more likely. The results are robust to using Tobin's Q as an alternative measure of investment opportunities and to exploiting within-Delaware variation in pre-reform SPV reliance. The debt contraction translates roughly one-for-one into reduced real investment. Together, these heterogeneous effects indicate that stronger creditor rights reallocate credit away from firms with limited growth prospects and toward more productive ones. By enabling lenders to discipline weak borrowers while extending credit to high-productivity firms, stronger creditor rights improve the allocation of capital and facilitate the unwinding of post-boom debt overhang.

Third, we turn to the nature of credit booms themselves. Countries with stronger creditor rights experience more frequent and larger credit expansions, consistent with a more elastic supply of credit. This highlights a potential policy trade-off: stronger creditor rights increase the likelihood of credit booms while mitigating the severity of their aftermath.[1] The evidence further indicate that the reallocation mechanism operates not only during the resolution of credit booms. In countries with stronger creditor rights, credit booms track underlying productivity more closely, channel more funding to risky firms, and also feature more bankruptcies during their build-up. Taken together, these patterns suggest that additional credit is directed toward productive investment opportunities rather than allocated indiscriminately. Stronger creditor rights therefore generate credit booms that are not only larger but also more closely tied to underlying productivity shocks.

[1]Note that we find smaller output losses of credit booms under strong creditor rights *conditional* on the size those booms.

Our findings suggest that the legal framework governing creditor–debtor relationships plays an important role in understanding boom–bust cycles. While stronger creditor rights are associated with a higher likelihood of booms, their aftermath is much less severe. Importantly, stronger creditor rights facilitate the efficient resolution of over-indebted firms. By enabling banks to liquidate firms with limited productivity or growth opportunities, they free up bank capital and promote a more efficient reallocation of credit, as in Antill and Clayton (2025).

Related Literature Our results contribute to several strands of literature. First, our findings 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 matter not only for the steady-state level of credit provision, but also for the incidence and aftermath of credit booms. Stronger creditor rights are associated with larger and more frequent booms, yet softer landings, a pattern we trace to the more efficient reallocation of resources in the aftermath of credit expansions.

Second, our paper contributes to the literature on credit cycles driven by financing frictions (Kiyotaki and Moore, 1997; Bernanke et al., 1999). 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, 2024), 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 plays an independent role, beyond the general efficiency of bankruptcy procedures, in shaping credit cycle outcomes.

Third, we complement research on financial frictions and misallocation. Financial frictions can impede the efficient reallocation of capital across firms and sectors (Eisfeldt and Rampini, 2006), and this misallocation tends to be most severe following periods of rapid credit growth

(Midrigan and Xu, 2014; Gopinath et al., 2017; Asriyan et al., 2021). Prolonged misallocation is often associated with continued lending to distressed borrowers (Hoshi and Kashyap, 2004; Peek and Rosengren, 2005; Caballero et al., 2008; Giannetti and Simonov, 2013; Schivardi et al., 2021; Acharya et al., 2024). For instance, Becker and Ivashina (2022) link sluggish GDP growth following the 2007–08 crisis specifically to weak insolvency regimes that prolonged such lending. 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. Closely related, Bian (2020) shows that an international coordination mechanism strengthening creditor rights in the airline industry leads to a reallocation of capital from less to more productive firms. Our paper extends this insight from a single industry to the macroeconomy, highlighting the role of creditor rights in the reallocation of credit over the course of the credit cycle.

2 Conceptual Framework

The effect of creditor rights on the propagation of credit booms is theoretically ambiguous. Stronger legal protections for creditors increase pledgeable income and relax borrowing constraints, expanding the supply of credit during the boom. Once the boom turns to bust, however, these same creditor protections can lead to a liquidation bias, amplifying fire-sale externalities, and generate a downward spiral in which lower asset prices tighten financing constraints and depress real activity. We refer to these channels collectively as the *amplification view*. A competing view holds that strong creditors enforce the liquidation of unproductive borrowers while easing borrowing constraints for new entrants, improving the allocation of resources and supporting the recovery. We call this the *dampening view*.

Whether the net effect of creditor rights is to amplify or dampen credit-cycle downturns is ultimately an empirical question. This section develops the theoretical arguments underlying each view and derives the testable predictions that guide our empirical analysis. A simple model formalizing how creditor rights shape credit allocation is presented in Appendix A.

2.1 The Amplification View

The amplification view rests on the premise that stronger creditor rights lead creditors to lend more aggressively, including to risky borrowers, raising leverage across the borrower distribution. When the boom turns to bust, this elevated leverage feeds three mechanisms that deepen the contraction.

Collateral feedback. Higher leverage means that a negative shock to asset values erodes borrower net worth more severely, triggering asset sales that depress collateral values further (Kiyotaki and Moore, 1997).[2]

Liquidation bias. Strong creditors may prefer to liquidate rather than reorganize, even when a firm is temporarily distressed but fundamentally viable, because they do not fully internalize its going-concern value (Shleifer and Vishny, 1992; Aghion et al., 1992). Empirically, strong creditor rights regimes are associated with faster and more liquidation-intensive resolution of insolvency (Davydenko and Franks, 2008; Djankov et al., 2008; Rodano et al., 2016).

Fire-sale externalities. Forced asset sales during downturns occur when resale prices are depressed, propagating distress across firms and sectors (Mian et al., 2015; Auclert et al., 2019; Kundu, 2021; Auclert and Mitman, 2023). Bernstein et al. (2019a,b) document that liquidation in bankruptcy can lead to inefficient asset allocation and negative spillovers on geographically proximate firms, magnifying the local cost of distress.

Taken together, the amplification view holds that these forces outweigh any benefits of cutting of credit to overly indebted but unproductive firms, as emphasized by our model in Appendix A. During the downturn, both viable and unviable firms lose access to financing as asset prices collapse and creditors initiate liquidations. The resulting allocation of capital is *inefficient*: stronger creditor rights produce larger, more fragile booms that unwind more sharply.[3]

[2] In Kiyotaki and Moore (1997), a pledgeability parameter governs the fraction of collateral value creditors can seize. Higher pledgeability reduces the margin requirement and raises leverage. Related amplification channels operate through borrower net worth in the financial accelerator framework of Bernanke et al. (1999), and through credit freezes in Diamond and Rajan (2011), where the prospect of fire sales leads liquid banks to hoard cash rather than extend term loans.

[3] Empirically, stronger creditor rights are associated with deeper credit markets (La Porta et al., 1998) and more favorable loan terms (Qian and Strahan, 2007; Bae and Goyal, 2009; Haselmann et al., 2010), while Houston et al. (2010) find that creditor rights correlate with higher bank risk-taking and a higher probability of banking crises. Within the U.S., Pence

2.2 The Dampening View

The dampening view agrees that stronger creditor rights boost credit supply, but also emphasizes two further forces: the disciplining effect of creditor rights on borrower behavior during the boom, and the capacity of strong creditors to reallocate credit efficiently once the boom turns to bust. We formalize the core argument in Appendix A and describe the underlying ideas below.

Borrower discipline. When default entails a loss of control, borrowers internalize more of the downside risk (Holmström and Tirole, 1997; Hart and Moore, 1998). By raising the cost of default for owner-managers, stronger creditor rights deter borrowers whose projects are unlikely to cover these higher expected losses, discouraging marginal, low-quality borrowers from taking on debt. This deterrence improves the quality of the economy's credit portfolio, leaving less distressed debt when the cycle turns.[4]

Efficient reallocation. Financial frictions impede the transfer of capital to its most productive uses, and these frictions tend to tighten during downturns (Eisfeldt and Rampini, 2006). Stronger creditor rights, however, relax borrowing constraints for viable firms and facilitate the liquidation of underperforming borrowers, thus freeing factors of production for more productive uses.[5]

Bank capital preservation. Stronger creditor rights protect bank balance sheets through two channels. Higher recovery rates reduce losses on the loans that default, while the ex-ante deterrence of risky borrowers lowers default rates in the first place. By preserving intermediary net worth (Davydenko and Franks, 2008; Ghent and Kudlyak, 2011; Rodano et al., 2016; Tantri, 2020;

(2006) and Dagher and Sun (2016) show that nonjudicial foreclosure, which strengthens creditors' rights, is associated with larger mortgage loans and lower interest rates, and Mian et al. (2015) document that the same states experienced larger house price declines and deeper output losses during the 2007–08 crisis.

[4]Related channels operate through the cost of liquidation (Shleifer and Vishny, 1992) and through ex-ante project selection when creditors gain control in default (Aghion et al., 1992). Empirically, Acharya and Subramanian (2009); Acharya et al. (2011); Vig (2013) document that strong creditor rights deter risky firms from borrowing.

[5]This mechanism is central to the framework of Antill and Clayton (2025), who show that crisis interventions stimulating corporate liquidations can improve aggregate capital allocation when financially constrained banks would otherwise continue lending to insolvent borrowers. Empirically, Bian (2020) finds that reforms strengthening creditor rights improve capital allocation, and Hoshi and Kashyap (2004) and Caballero et al. (2008) document how continued lending to distressed firms in Japan prolonged macroeconomic stagnation.

Heitz and Narayanamoorthy, 2021), both channels allow banks to keep extending credit to viable borrowers during the downturn.[6]

2.3 Empirical Implications

The amplification and dampening views disagree about whether stronger creditor rights make the economy more fragile or more resilient in the wake of credit expansions. Of course, the underlying mechanisms are not mutually exclusive. What we are ultimately interested in is to document which set of forces dominates empirically.

The amplification view is, in essence, pessimistic about the role of creditor rights. It emphasizes a strong feedback loop between borrowing constraints and asset prices, compounded by excessive liquidations. The result is capital flowing toward financially unconstrained buyers rather than toward its most productive users. Downturns following credit booms should therefore be deeper where creditors are strong.

The dampening view, by contrast, implies that stronger creditors ease credit constraints on productive borrowers while tightening them on unproductive ones. An ill-fated credit boom then unwinds through more limited loan losses and a swift reallocation of credit. Downturns should therefore be milder where creditors are strong.

We take these competing implications to the data in three steps: the aftermath of credit booms in Section 4, the firm-level reallocation of credit in Section 5, and the incidence and nature of the booms themselves in Section 6.

[6]Higher recovery values under stronger creditor rights are partly explained by faster bankruptcy proceedings (Djankov et al., 2007), which themselves improve recovery (Ponticelli, 2016; Iverson, 2018; Müller, 2022). The role of bank net worth in absorbing shocks is formalized in He and Krishnamurthy (2013) and Brunnermeier and Sannikov (2014). Becker and Ivashina (2022) link sluggish post-crisis GDP growth to weak insolvency regimes that allowed continued lending to distressed borrowers while impairing bank balance sheets.

3 Data Sources and Variable Construction

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

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

Our primary source is the creditor rights index from Djankov et al. (2007), which builds on the foundational work of La Porta et al. (1998). This index captures four key legal 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) as refined by Albertus et al. (2026), 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. Both indices correlate strongly, indicating that they indeed measure the same latent concept: their cross sectional correlation in 2003 is $\rho = 0.407$, see Appendix Figure B.1.

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

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

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

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 B.2 illustrates the composite index $L_{i,t}$ for all country-year observations with coverage on key macroeconomic variables, including aggregate firm credit. In robustness checks, we show our results also hold using alternative ways of measuring creditor rights and that they do not depend on how we combine these indices.

Credit and Macroeconomic Data We obtain comprehensive data on credit to the private sector from the Bank for International Settlements (BIS). The BIS provides data on total debt securities and loans to non-financial corporations, overlapping with 43 countries between 1978 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 (2024), 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 capturing a 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.

3.2 U.S. Firm-Level Data

To complement our cross-country analysis, we construct a firm-level panel dataset at the quarterly frequency, covering publicly listed US companies from 1995 to 2004. This data is well-suited for our identification strategy, which relies on larger corporations sponsoring special purpose vehicles (SPVs).

Firm-level quarterly financial statements and stock prices are obtained from *Compustat* North America. We code firms' time-specific incorporation state following Spamann and Wilkinson (2019) based on scraped SEC filings to avoid measurement error from using Compustat information on the most recent state of incorporation. To focus on the private non-financial sector, we drop firms from the financial industry (SIC 6000-6999), government sector (SIC 9000-9999) and heavily regulated distribution of electricity, gas, water and waste management (SIC 4900-4999).

To assess effect heterogeneity along firms' productivity distribution, we follow the literature on misallocation (e.g., Hsieh and Klenow, 2009) and estimate the firm-quarter-specific marginal revenue product of capital (MRPK) as:

$$\text{MRPK}_{f,q} = \theta_{s(f)} \frac{r_{f,q}}{k_{f,q}} \tag{2}$$

where f and q index firms and time at quarterly frequency; $\theta_{s(f)}$ is the Cobb-Douglas revenue elasticity of capital for the 2-digit SIC sector (s) of firm f; $r_{f,q}$ is revenue as measured by Compustat variable *saleq*; and $k_{f,q}$ is the capital stock proxied by Compustat variable *ppegtq* accounting for gross value of property, plant and equipment. We estimate $\theta_{s(f)}$ using the standard procedure by

Levinsohn and Petrin (2003) for each 2-digit sector over the sample 1990q1-2009q4.[8] Whenever the estimate for a given 2-digit sector is statistically insignificant—for example, due to a small sample size—we use the estimate from the 1-digit sector.[9]

In robustness checks, we also use Tobin's Q as an alternative forward-looking measure of firms' productivity:

$$Q_{f,q} = \frac{\text{market value of equity}_{f,q} + \text{book value of debt}_{f,q}}{\text{book value of assets}_{f,q}}. \tag{3}$$

Equity market value is the quarter-end stock price times number of shares outstanding as measured by Compustat's *prccq* and *cshoq*; book value of debt and assets is measured by Compustat's *ltq* and *atq*, respectively. In contrast to MRPK, which is entirely based on accounting data, Tobin's Q provides a forward-looking assessment of a firm's economic potential because it is based on market valuations. However, market prices can be subject to nonfundamental fluctuations, an important concern for us as we study an episode of substantial stock market price collapse and volatility.

Creditor rights are most relevant when firms approach default. To test whether the effects of creditor rights vary with credit risk, we measure each firm's probability of default following the simplified Merton model of Bharath and Shumway (2008), which maps the distance to default into a default probability using the standard normal distribution.[10]

Finally, we manually collect data on subsidiaries from Exhibit 21 of firms' 10-K filings with the Securities and Exchange Commission. Specifically, we count the number of subsidiaries organized as limited liability companies or partnerships, which are the most common legal forms for SPVs (Feng et al., 2009).

[8] In addition to the revenue and capital stock, Levinsohn and Petrin (2003) require measures of labor as well as another flexible input factor, e.g., intermediate inputs. As other studies, we proxy labor inputs by Compustat's *xsgaq* accounting for "selling, general, and administrative expense". We proxy intermediate inputs by Compustat's *cogsq* accounting for "cost of goods sold".

[9] A potential concern is that measurement error in capital correlates with our exposure variables (firms' ex-ante productivity and state of incorporation). The Dotcom boom-bust was driven by internet-related sectors, in which intangible capital plays an outsized role and which were geographically concentrated on the U.S. west coast. To address this concern, we include 2-digit SIC sector $\times$ time fixed effects in the regressions, so that all comparisons are made within sectors.

[10] Specifically, $P_{f,q} = \Phi(-D_{f,q})$, where $D_{f,q} = \left[\log\left(\frac{E_{f,q}+D_{f,q}}{D_{f,q}}\right) + (r_{f,q-1} - 0.5\sigma^2_{a,f})\right]/\sigma_{a,f}$, $E_{f,q}$ is market equity, $D_{f,q}$ is book debt, $r_{f,q-1}$ is the lagged quarterly equity return, and $\sigma_{a,f}$ is asset volatility estimated from the 5-year trailing standard deviation of stock returns.

3.3 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. The 10$^{\text{th}}$ percentile value is 15.7, while the 90$^{\text{th}}$ percentile value is 92.8. The median observation in our regression sample sits at the 69th percentile of the index distribution.[11] The business debt-to-GDP ratio averages 72.6% and exhibits substantial variation: 20% of observations show three-year changes outside the $[-9.4, +13.8]$ percentage point 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 and 25% of firm-quarters are risky (rated B+ or worse).

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 focus first on GDP growth before turning to the channels through which creditor rights shape these outcomes.

4.1 Methodology

We estimate a state-dependent local projection model that allows the aftermath of credit expansions to vary across institutional regimes:

$$\Delta_h \log(y_{i,t+h}) = \alpha_{i,h} + \beta_{1,h}\Delta_3 c_{i,t} + \beta_{2,h}\Big(\Delta_3 c_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \boldsymbol{\gamma}_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{4}$$

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 (1). The key coefficient of interest, $\beta_{2,h}$, captures how the macroeconomic consequences of changes in business debt vary with the strength of creditor protection. The specification is symmetric: it

[11] 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 B.1 for summary statistics based on the full available sample for each variable.

Table 1: Summary Statistics for Estimation Samples

(a) Cross-Country Data

	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

	N	Mean	SD	Q10	Q50	Q90
Real debt growth, annual (%)	2939	-13.77	97.82	-87.56	-7.48	57.93
Book assets (mio. USD)	3384	2163.36	10802.92	7.31	169.61	3335.43
Leverage ratio at market values	3384	1.69	4.21	0.01	0.29	3.76
MRPK	3384	0.13	0.60	0.01	0.05	0.20
S&P rating (AAA=0, D=23)	836	10.00	4.03	5.00	10.00	14.00

Notes: This table 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 for the cross section of 2001Q4.

estimates the marginal effect on GDP of a one-unit change in $\Delta_3 c_{i,t}$ regardless of its sign. We refer to $\Delta_3 c_{i,t}$ as capturing "credit booms" throughout, and verify below that our results are driven by expansions rather than contractions.

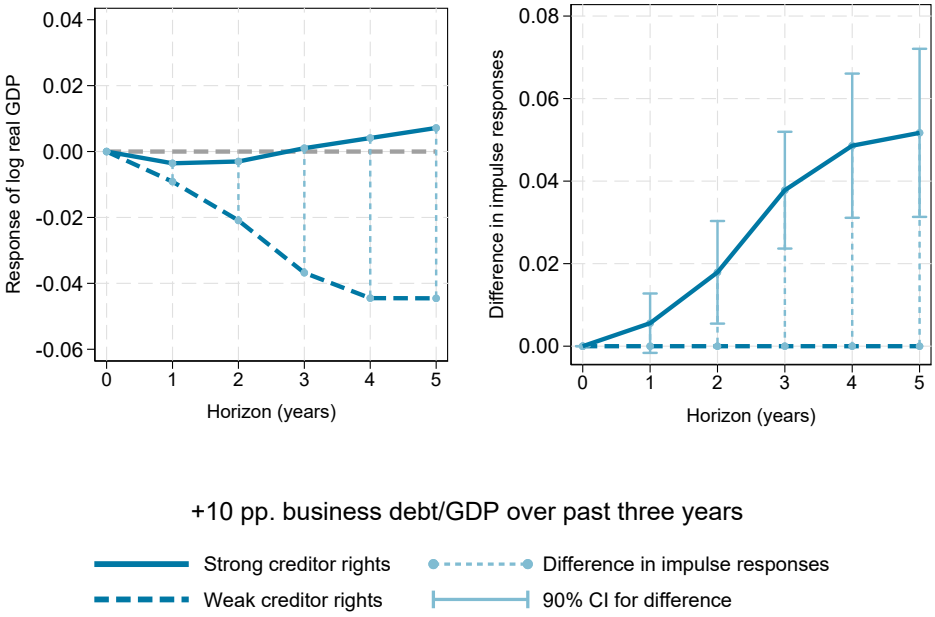
The vector of controls, $\boldsymbol{x}_{i,t}$, includes lagged real GDP growth and the contemporaneous change in household debt-to-GDP, allowing us to disentangle the role of business credit from broader credit market dynamics. We also include horizon-specific country fixed effects, $\alpha_{i,h}$,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

4.2 Main Results

Figure 1 presents our central finding: changes in business credit predict a markedly different path of output 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 is followed by a decline in real GDP of 4-5 percentage points by year five. By contrast, in countries with the strongest creditor rights ($L_{i,t} = 1$), output is essentially unaffected. Appendix Table B.2 reports all coefficient estimates and regression diagnostics for each horizon.

Figure 1: Creditor Rights and Real GDP After Business Credit Booms



Notes: This figure visualizes estimates from the local projection equation (4) for a 10 percentage point increase in the business debt-to-GDP ratio over the preceding three years. The left 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 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.

These differences are economically large, and they speak directly to the competing views laid out in Section 2. The *amplification view* predicts that strong creditor rights deepen post-boom contractions, whereas the *dampening view* predicts that they cushion them. The patterns in the macroeconomic data are inconsistent with amplification and favor dampening.

Boom-Bust Asymmetry The baseline specification is symmetric and so, by construction, cannot tell us whether the differential GDP response to creditor rights is driven by credit expansions, contractions, or both. The distinction matters: the conceptual framework in Section 2 suggests that creditor rights operate through the resolution of distress, which arises after credit *expansions*,

when many borrowers become distressed at once. If the baseline result were instead driven by contractions, the reallocation channel we propose would not be the operative mechanism.

We therefore estimate local projections that allow for sign asymmetry, as in Ben Zeev et al. (2023), defining booms and busts by the three-year change in log real business credit rather than the change in business debt-to-GDP, so that the sign reflects movements in credit rather than in GDP. The rest of the specification is unchanged. Appendix Figure B.3 documents a stark asymmetry. Following credit expansions, economies with strong creditor rights experience substantially better output trajectories than those with weak creditor rights, and the difference is large and statistically significant. Following credit contractions, the differential effect is small and indistinguishable from zero. The baseline result is driven entirely by what happens after credit booms—exactly where the framework predicts creditor rights should bind.

4.3 Robustness

The differential GDP response across creditor rights regimes could in principle arise from confounding factors rather than creditor rights themselves. Countries with strong creditor rights may have higher-quality institutions more generally, less real-estate-intensive booms, or higher-quality credit during expansions—any of which our interaction term could mechanically absorb. A further concern is that the creditor rights index is coarse, and our splicing of the Djankov et al. (2007) and Gurrea-Martinez (2025) indices may introduce measurement error. We address each of these possibilities below.

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

(4) for each group. Appendix Figure B.5 shows remarkably consistent results across both sets of countries.

Quality of Bankruptcy Laws We next test whether creditor rights merely proxy for general bankruptcy efficiency, which has been shown to mitigate the macroeconomic fallout from credit booms (Jordà et al., 2022; Kornejew et al., 2024). First, controlling for the bankruptcy efficiency measure of Kornejew et al. (2024) leaves the differential GDP response to credit expansions intact (Appendix Figure B.4c). This points to creditor enforcement, rather than general bankruptcy effectiveness, as the relevant channel.

Second, we contrast creditor rights with debtor protections using the debtor rights indices from Gurrea-Martinez (2025). Creditor and debtor rights are not zero-sum: a well-designed bankruptcy system can strengthen both, for instance by granting secured creditors priority while also providing debtors with access to reorganization procedures. This is precisely why the contrast is informative. If our results simply reflected overall legal quality rather than creditor enforcement per se, stronger debtor protections should be associated with similarly muted responses to credit booms. Instead, we find the opposite: stronger debtor rights are, if anything, associated with worse GDP outcomes following credit booms, shown in Appendix Figure B.6. This directional difference suggests that it is specifically the enforcement power of creditors—the ability to seize collateral, force liquidation, and recognize losses—that drives the dampening effect, rather than the overall sophistication of the insolvency regime. By shielding borrowers from creditor enforcement, stronger debtor protections may instead prolong distress by delaying restructuring and liquidation.

Nature of the Boom Müller and Verner (2024) and Ivashina et al. (2024) document that real-estate-driven credit expansions are followed by sharper downturns, while Kirti (2025) shows that booms with a higher share of high-yield debt issuance predict worse recessions. Appendix Figures B.7a and B.7b address these concerns by controlling for the real-estate share of credit growth and the high-yield share of debt issuance, respectively. The estimates remain highly similar to the baseline, indicating that the differential GDP response we attribute to creditor rights does not reflect systematic differences in boom composition.

Creditor Rights Measures Our results are stable across alternative measurement approaches. Appendix Figure B.8 shows consistent results using either the Djankov et al. (2007) or the Gurrea-Martinez (2025) index. A particular challenge arises because Gurrea-Martinez (2025) classifies multiple bankruptcy procedures within a given country. Absent reliable data on the relative utilization of these procedures, we adopt the maximum creditor rights across procedures as our baseline, which yields the strongest correlation with Djankov et al. (2007) during the overlapping period. Appendix Figure B.9 shows that our results are robust to alternative definitions: we re-estimate using (i) the procedure offering the weakest protection for secured creditors and (ii) the procedure offering the strongest protection for debtors, the latter reflecting the fact that debtors can often select strategically among available procedures.

Finally, to address concerns about our splicing method, we estimate the results separately before and after 2003, the year in which the Djankov et al. (2007) index ends and the Gurrea-Martinez (2025) index begins. Appendix Figure B.10 shows that our core results hold in both periods, confirming that they are not driven by the change in measurement or by the 2007–2009 Global Financial Crisis.

4.4 Mechanisms

Why do economies with weak creditor rights suffer persistent output losses after credit expansions, while those with strong rights largely avoid them? The aftermath of a credit boom could differ across creditor-rights regimes because credit contracts more sharply where rights are weak, or because a similar quantity of credit is allocated differently. The evidence in this section points to the latter: where creditor rights are weak, credit appears to remain tied to distressed and unproductive borrowers rather than being reallocated toward more viable uses, a pattern that coincides with persistent weakness in bank balance sheets. We document the differences in reallocation first, then turn to their counterpart in banking sector health.

Credit Reallocation. The dampening view laid out in Section 2 emphasizes that creditor rights shape whether capital remains tied to unproductive firms or is redirected toward more productive uses. Under weak creditor rights, banks facing poor recovery prospects have an incentive to "gamble for resurrection," continuing to lend to risky borrowers in the hope of avoiding loss recognition. Under strong creditor rights, banks can foreclose and restructure promptly, which

should facilitate the reallocation of credit from failing to viable firms. We now examine whether the data are consistent with this account.

A direct implication is that credit should be reallocated more aggressively when creditor rights are strong. We measure the allocation of credit across sectors using data from Müller and Verner (2024), which yields, for each country-year, the vector of sectoral shares in total business credit. To the extent that reallocation crosses sectoral boundaries, it shifts this vector over time. We therefore use the Euclidean distance between a country's sectoral share vectors at $t+h$ and t as an index of credit reallocation, estimated as the dependent variable in a local projection based on Equation (4):

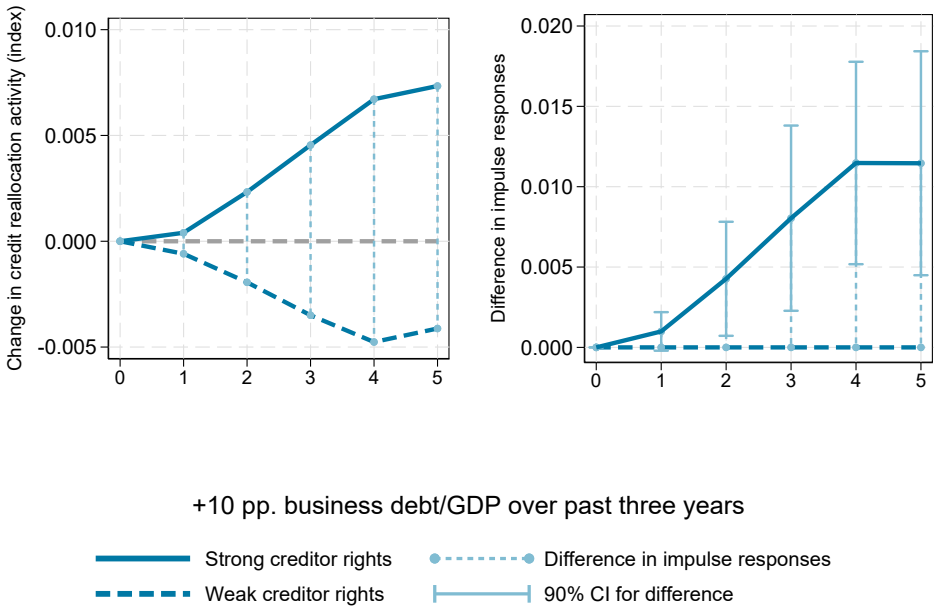
$$\mathrm{CR}_{c,t,h} = \sqrt{\sum_{i=1}^{N} \left(s_{i,c,t} - s_{i,c,t-h}\right)^2},$$

where $s_{i,c,t}$ is the share of total business credit allocated to sector i in country c at time t and N is the number of sectors. We control for the degree of reallocation during the boom by including the Euclidean distance between the share vectors at t and $t-3$. By construction, this index captures the *extent* of sectoral reshuffling, not whether credit moves toward more productive uses: a country could register a high reallocation index while shifting credit in the wrong direction. We therefore assess the *efficiency* of reallocation separately below.

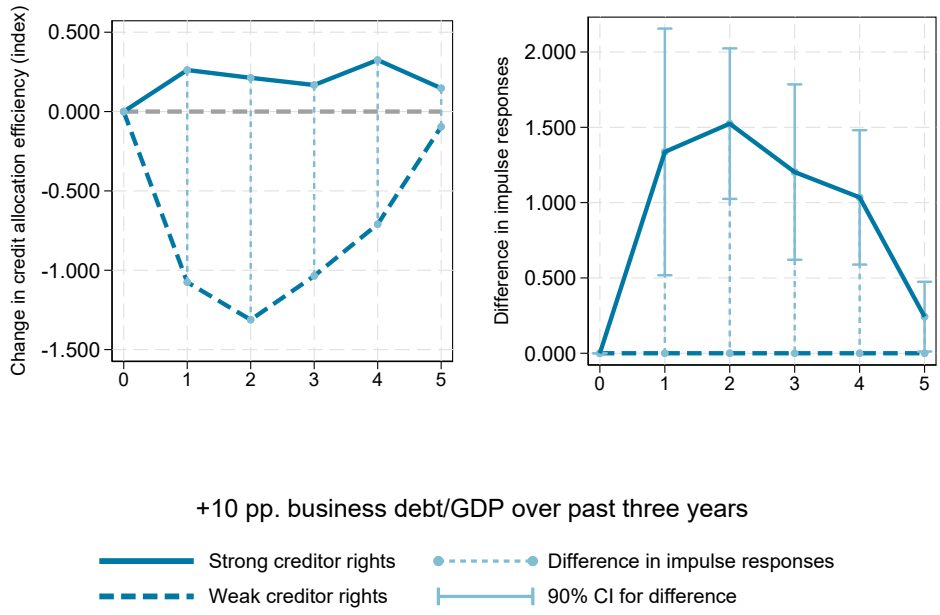
Business credit booms are followed by increased reallocation where creditors are well protected. Under strong creditor rights, the boom raises the reallocation index by about 0.005 above its normal three-year pace of 0.008, an increase of roughly 60 percent. Under weak creditor rights, by contrast, reallocation falls below its normal pace, shown in Figure 2a.

Figure 2: Creditor Rights and Credit Reallocation after Business Credit Booms

(a) Sectoral Credit Reallocation Index



(b) Elasticity of Sectoral Credit to Productivity Growth



Notes: These figures visualize estimates from local projections using Equation (4). In Panel (a), the dependent variable is the Euclidean distance between the sectoral business debt share vectors at $t+h$ and t; in Panel (b), it is the efficiency of sectoral credit reallocation, measured as the correlation between sectoral credit growth and sectoral productivity growth. We plot the response to a 10 percentage point 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 ($0.1 \times (\hat{\beta}_{1,h} + \hat{\beta}_{2,h})$, solid line) and the weakest creditor rights ($0.1 \times \hat{\beta}_{1,h}$, dashed line). The right panels plot the difference between those impulse responses ($\hat{\beta}_{2,h} \times 0.1$) with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

The composition of new debt issuance offers a complementary perspective on credit reallocation. Using data on the riskiness of corporate bond issuance from Kirti (2025), Appendix Figure B.11a shows that the high-yield share of debt issuance declines after booms where creditor rights are strong, while remaining elevated where rights are weak. Appendix Figure B.11b shows that this pattern is accompanied by a widening of credit spreads under strong creditor rights, with no comparable repricing under weak rights. The elevated risky issuance and muted spread response under weak creditor rights are consistent with risky borrowers retaining access to credit without a commensurate increase in borrowing costs.[12]

Efficiency of Credit Reallocation. Because the reallocation index measures only the extent of sectoral reshuffling, a natural question is whether the reallocation under strong creditor rights is also *efficient*: whether credit flows toward sectors with higher productivity growth. Measuring allocative efficiency is difficult. We use sectoral productivity estimates from official growth accounts, harmonized in the KLEMS database, to compute, for each country-year, the correlation between sectoral credit growth and sectoral productivity growth:

$$\rho\Big(\Delta_h \log(a_{i,t,s}),\ \Delta_h \log(c_{i,t,s}) \,\Big|\, i, t\Big). \tag{5}$$

This approach is similar in spirit to Wurgler (2000), who uses the correlation between investment and output growth to gauge the efficiency of *capital* allocation, and is further motivated by Gorton and Ordoñez (2020), who show that "bad" credit booms—those ending in downturns—are accompanied by a slowdown in productivity growth. We use this correlation as the dependent variable in local projections analogous to Equation (4).

Figure 2b plots the results. Under strong creditor rights, the efficiency of reallocation remains at or above normal levels even after a credit expansion: credit continues to flow toward sectors

[12] 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 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 struggle to distinguish firms with strong fundamentals from those sustained by continued bank support, even absent 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, which operate through observable defaults, restructurings, and recovery outcomes that shape market-wide beliefs.

with stronger productivity growth. Under weak creditor rights, this correlation breaks down, and credit growth becomes decoupled from productivity. The muted reallocation documented above thus appears to reflect not simply less reshuffling of credit but reshuffling that no longer tracks where productivity is rising.

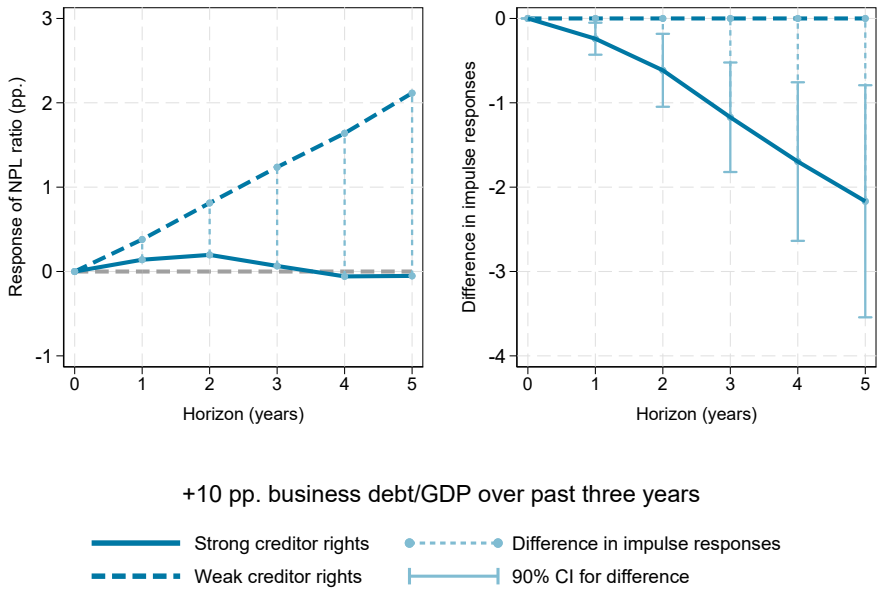
Banking Sector Health. The reallocation patterns documented above have direct implications for the health of the banking sector. If weak creditor rights keep credit tied to distressed borrowers rather than redirecting it toward more productive uses, the consequences should be visible on bank balance sheets. Stronger creditor rights, by contrast, should preserve bank asset quality, both because the ex-ante threat of liquidation should lower default rates and because of higher recovery rates reduce losses on the loans that end up defaulting.

The evidence is consistent with this account. Figure 3a reports the response of the aggregate non-performing loan (NPL) ratio to credit expansions, using a hand-collected panel from national central banks and the IMF Financial Soundness Indicators. Where creditor rights are weak, credit expansions are followed by a sharp rise in NPLs; where rights are strong, the increase is muted and NPL ratios remain largely stable. This deterioration in asset quality mirrors the allocation patterns documented above: where credit remains concentrated in distressed sectors, loan books worsen accordingly. The same divergence appears in market valuations of bank capital. Figure 3b plots the response of bank equity returns from Baron et al. (2021): equity markets price in sustained declines in bank capital under weak creditor rights, consistent with the impairment of the assets banks hold, while bank equity is largely unaffected under strong creditor rights.

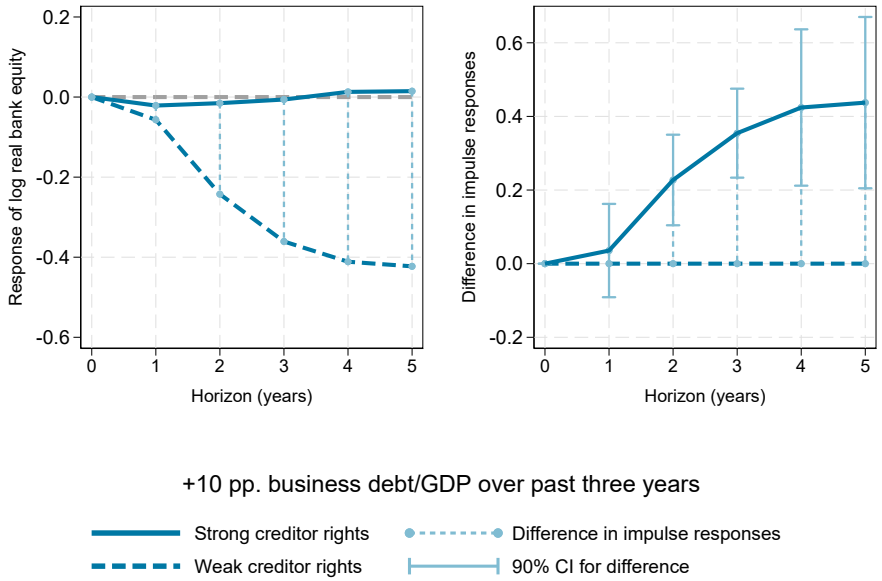
Notably, this deterioration in bank health does not translate into a contraction in the outstanding stock of credit, which includes both performing and non-performing loans. Appendix Figure B.12 shows that aggregate business debt follows broadly similar trajectories under strong and weak creditor rights. Our interpretation is that a comparable stock of credit remains on bank balance sheets no matter the extent of creditor rights.

Figure 3: Nonperforming Loans and Bank Balance Sheets after Business Credit Booms

(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 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 and five lags of the dependent variable, real GDP growth, and changes in the household debt-to-GDP ratio. Within each panel, the left graph plots the impulse response under strong creditor rights ($L_{i,t} = 1$, solid line) and under weak creditor rights ($L_{i,t} = 0$, dashed line). The right graph plots the difference between those impulse responses, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

Taken together, these patterns suggest that where creditor rights are weak, credit reallocation is both limited and decoupled from productivity, while loan books deteriorate and bank capital erodes. This configuration is consistent with weak creditor rights allowing distressed credit to persist on bank balance sheets rather than being redeployed to more productive uses. While these aggregate patterns are consistent with a role for creditor rights in reallocating credit during downturns, they cannot by themselves isolate causal effects. We therefore turn to firm-level evidence and a quasi-natural experiment.

5 Causal Firm-Level Evidence from US State-Level Legal Reforms

The macroeconomic evidence presented above is consistent with creditor rights facilitating a more efficient reallocation of credit following a boom, softening the ensuing downturn. In this section, we turn to microeconomic data and a quasi-natural experiment to further support this interpretation. Specifically, we exploit variation in creditor rights within the United States 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, 2019).

5.1 Antirecharacterization Laws

Between 1997 and 2005, seven U.S. states adopted antirecharacterization statutes.[13] These laws strengthened secured creditors' claims on collateral pledged through special purpose vehicles (SPVs), guaranteeing that creditors could seize such collateral in bankruptcy rather than risk having it pulled back into the borrower's estate.

These structures are widely used: Feng et al. (2009) estimate that 59% of publicly listed U.S. firms used at least one SPV in 2004. In a typical structure, the sponsor transfers collateral, often real estate, to an SPV, which issues debt backed by that collateral. The sponsor then leases the asset back, and its lease payments service the SPV's debt.[14] The key feature is that SPVs are *bankruptcy*

[13] Texas and Louisiana introduced these laws in 1997, followed by Alabama (2001), Delaware (2002), South Dakota (2003), Virginia (2004), and Nevada (2005). Ohio and North Carolina adopted similar statutes in 2001 and 2002 but affected only financial firms (Favara et al., 2021).

[14] SPVs are typically consolidated into the sponsor's financial statements. Before FIN 46 (January 2003), consolidation required the sponsor to own at least 50% of SPV equity; FIN 46 extended consolidation to smaller equity stakes and

remote: if the sponsor enters bankruptcy, the SPV's assets remain available to its secured creditors, who can seize and liquidate them outside the bankruptcy process.

Bankruptcy remoteness depends on the legal characterization of the collateral transfer. If a court treats the transfer as a "true sale," the assets sit safely with the SPV and its creditors are insulated. But absent statutory protection, bankruptcy judges retain discretion to *recharacterize* the transaction as a secured loan rather than a true sale. In that case, the collateral is pulled back into the sponsor's bankruptcy estate, subjected to automatic stay, and potentially used to satisfy other claims. Recharacterization risk was substantial and actively litigated, materially weakening secured creditors' expected recovery from SPV structures (Li et al., 2016).

Antirecharacterization statutes eliminated this risk. By codifying that qualifying SPV transfers would be treated as true sales, the laws gave secured creditors direct, immediate access to SPV collateral in the event of sponsor bankruptcy. The change took effect with no phase-in: firms incorporated in an adopting state were immediately subject to a stronger creditor rights regime. Our analysis focuses on Delaware's January 2002 reform, which took effect just after the peak of the Dotcom credit boom and applied to a substantial share of U.S. corporations, given Delaware's dominance as an incorporation jurisdiction.

5.2 Creditor Rights, Capital Productivity, and Credit Allocation after Dotcom

Setting and identification. We focus on Delaware's adoption of antirecharacterization laws in January 2002, which immediately followed the unwinding of the *Dotcom* boom as shown in Figure 4. The boom involved not only a stock market bubble but also a sizable credit expansion. From 1996 to 2001, the U.S. corporate debt-to-GDP ratio increased by around 10 percentage points—a similar magnitude as during the four years leading up to the Great Financial Crisis.

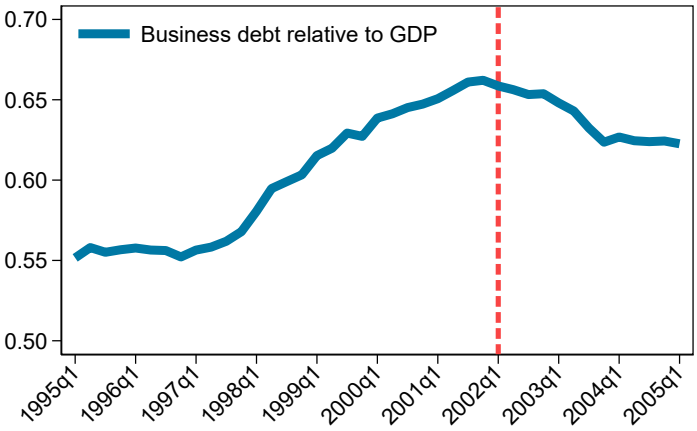
Two features of this setting are important for identification. First, the reform did not arise as a discretionary response to the Dotcom bust. It reflected a resolution of longstanding legal debates over recharacterization risk and bankruptcy remoteness in structured finance.[15] Second,

certain non-equity interests such as guarantees. See also FIN 46(R) and ASC 810. For broader background on SPVs and recharacterization, see Gorton and Souleles (2007) and Kettering (2008).

[15] Concerns about the treatment of SPVs and "true sale" doctrine had been discussed in Delaware legal circles throughout the 1990s, including in reports by the Delaware State Bar Association and in legal scholarship analyzing Delaware case law (Schwarcz, 1994, 1997; Delaware State Bar Association, 1999). These discussions predated the Dotcom boom and were tied to Delaware's incentives to provide legal certainty as a leading incorporation jurisdiction (Kahan and Kamar, 2002).

Delaware's reform occurred at the *end* of the credit expansion. Delaware firms were therefore exposed to the boom under the same creditor rights regime as firms in other states. Any differential outcomes after January 2002 reflect the impact of creditor rights on the resolution of distress, not on the nature of the preceding boom.

Figure 4: Dotcom Credit Boom and Delaware's Antirecharacterization Law Reform



Notes: The figure plots aggregate US business debt relative to GDP. The vertical line marks the quarter in which Delaware introduced antirecharacterization laws.

Sample and empirical strategy. We compare Delaware firms to comparable firms in states that never adopted antirecharacterization laws, dropping firms incorporated in states that reformed earlier, during, or after the early 2000s (Louisiana, Texas, Alabama, and South Dakota).[16]

The cross-country evidence in Section 4 suggests that creditor rights operate by reallocating credit away from low-productivity firms and toward viable ones. We test this directly at the firm level by examining whether the reform's effect on debt varied with firm productivity. The reallocation mechanism predicts that low-productivity firms should see their borrowing contract while high-productivity firms should be unaffected or expand.

Specifically, we estimate the following difference-in-difference specification:

$$\log(d_{f,q}) = \phi_f + \sigma_{s(f),q} + \beta_{0,q}\, a_{f,2001q4} + \beta_{1,q}\, l_{f,2001q4} + \beta_{2,q}\left(l_{f,2001q4} \times a_{f,2001q4}\right) + \epsilon_{f,q}, \tag{6}$$

[16] Our estimation window covers two years on each side of Delaware's reform. Later reforms in Virginia and Nevada fall outside the sample.

where $d_{f,q}$ is real long- and short-term debt outstanding (Compustat *dlttq* + *dlcq*, deflated by CPI), $l_{f,2001q4}$ indicates Delaware incorporation as of Q4 2001, and $a_{f,2001q4}$ is the firm's percentile in the cross-sectional MRPK distribution as of Q4 2001.[17] The specification includes firm fixed effects ϕ_f and sector $\times$ quarter fixed effects $\sigma_{s(f),q}$, which absorb time-invariant firm characteristics and sector-specific debt dynamics.

The coefficients of interest are $\beta_{1,q}$ and $\beta_{2,q}$, both indexed by quarter to trace the dynamics of the reform effect. The coefficient $\beta_{1,q}$ captures the debt trajectory of the least productive Delaware firms ($a_{f,2001q4} = 0$) relative to comparable non-Delaware firms. The interaction $\beta_{2,q}$ captures how this effect varies along the productivity distribution: a positive $\beta_{2,q}$ means that more productive Delaware firms experience a smaller contraction (or an expansion) in debt.[18]

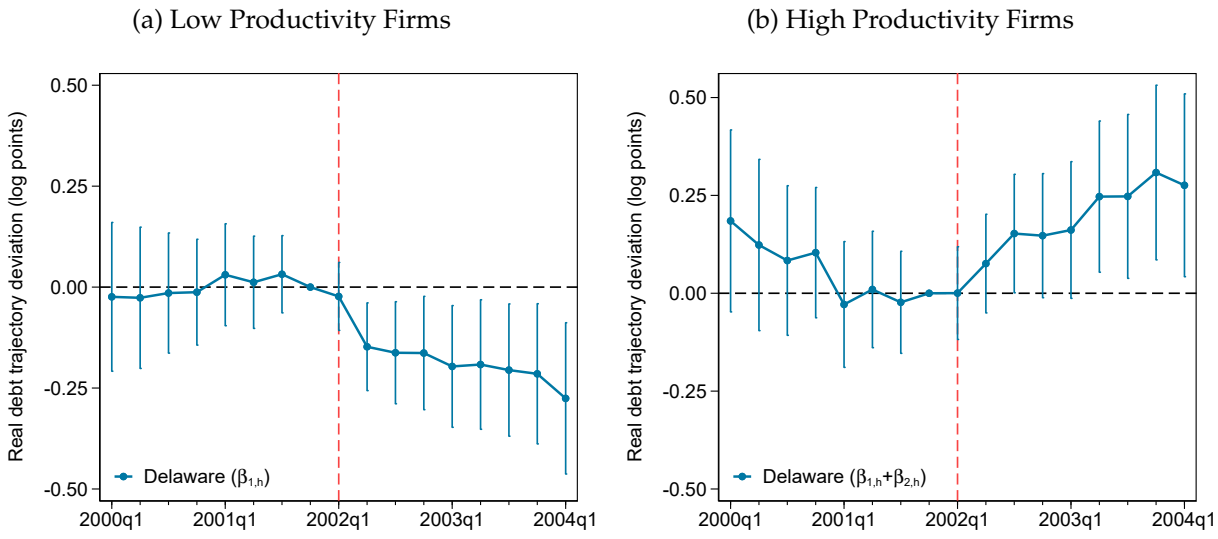
Event study results. Figure 5 traces the dynamics of the reform's effect on debt, depending on firms' initial productivity. The figure serves two purposes: it documents the timing of the response, and it tests the parallel-trends assumption that underpins the difference-in-differences design. We present the quarter-by-quarter estimates, with coefficients expressed relative to Q4 2001. Panel (a) shows $\hat{\beta}_{1,q}$: after the reform, low-productivity Delaware firms experience a sharp decline in debt relative to comparable firms elsewhere. Panel (b) shows $\hat{\beta}_{1,q} + \hat{\beta}_{2,q}$: high-productivity Delaware firms see a similar increase in debt growth. Neither panel shows a clear differential pre-reform trend, supporting the parallel-trends assumption. The pattern is exactly what the reallocation mechanism predicts: stronger creditor rights cut credit to firms with limited productive capacity while preserving (or even expanding) it for viable ones.

Robustness and extensions. While Figure 5 establishes a clear event study pattern, we now address whether the result reflects differences in firm size or pre-reform leverage rather than productivity, whether it is specific to firms close to default or generalizes to safe firms as well, whether it is an artifact of how we measure productivity, and whether the cross-state comparison holds up against unobserved Delaware-specific shocks. Table 2 addresses each of these questions in turn.

[17] We use incorporation states as of Q4 2001 following Spamann and Wilkinson (2019) based on scraped SEC filings to avoid measurement error in Compustat's location data, which is based on the most recent incorporation state.

[18] Productivity $a_{f,2001q4}$ is an absolute cross-sectional ranking, not a within-state ranking. High- and low-productivity firms in Delaware and other states are therefore directly comparable.

Figure 5: Creditor Rights Reform and Debt Growth during the Dotcom Bust



Notes: The figure visualizes estimates of panel regression Equation (6). Panel (a) shows $\hat{\beta}_{1,q}$, i.e., the deviation of Delaware firms' debt trajectory among firms with the least capital productivity ($a_{f,2001q4} = 0$) for each quarter q in the sample. Panel (b) shows $\hat{\beta}_{1,q} + \hat{\beta}_{2,q}$, i.e., the deviation of Delaware firms' debt trajectory among firms with the highest capital productivity ($a_{f,2001q4} = 1$) for each quarter q in the sample. Coefficients and their 95% confidence intervals are expressed relative to $\hat{\beta}_{1,2001q4}$. Confidence intervals are based on standard errors clustered at the firm-level.

For tractability, we collapse the quarterly coefficients into a binary pre-post comparison:

$$\log(d_{f,q}) = \phi_f + \sigma_{s(f),t} + \boldsymbol{\beta}_{0,t}\boldsymbol{x}_{f,2001q4} + \beta_{1,t}\, l_{f,2001q4} + \beta_{2,t}\left(l_{f,2001q4} \times a_{f,2001q4}\right) + \epsilon_{f,q}, \tag{7}$$

where $t = \mathbb{1}(q > 2001\text{q4})$ and $\boldsymbol{x}_{f,2001q4}$ includes firm size (percentile of total book assets) and market leverage, both measured in Q4 2001 and interacted with the post indicator. The coefficient $\beta_{1,1}$ captures the average change in log real debt for the least productive Delaware firms between the pre-reform period (2000q1–2001q4) and the post-reform period (2002q1–2003q4); $\beta_{2,1}$ captures how this change varies with firm productivity.

Column (1) presents the baseline specification. Low-productivity Delaware firms shed debt relative to comparable firms outside Delaware, and this effect is attenuated and eventually reversed for more productive firms, confirming the dynamic pattern in Figure 5 and consistent with our prediction on heterogeneous firm-level effects. The coefficient of -0.151 suggests an average decline in debt of 15% with the strengthening of Delaware's creditor rights. The interaction term coefficient of 0.254 implies that this effect is more than mitigated for highly productive firms.

The remaining columns confirm the validity of this finding. Creditor rights should bind for firms where default is reasonably likely. Columns (2)–(3) thus split the sample by credit risk, measured by the probability of default following Bharath and Shumway (2008). The reallocative effect is sharply concentrated among risky firms, where creditors are closest to assuming control rights, and effectively absent among safe firms. This pattern is consistent with the dampening view and helps rule out alternative explanations operating through, for example, broader changes in Delaware's corporate environment that should affect all firms equally.

One concern with MRPK as the productivity measure may be that it relies entirely on accounting data and may misclassify firms during periods of rapid technological change. Column (4) replaces MRPK with Tobin's Q, which incorporates forward-looking market valuations. The estimates are highly similar to the baseline results, suggesting they are not driven by how we measure productivity.

Comparing firms across states allows us to identify the average effect of the reform but cannot rule out unobserved Delaware-specific shocks. Column (5) addresses this by exploiting within-Delaware variation in firms' ex-ante exposure to the reform. Specifically, we hand-collect a proxy for pre-reform SPV reliance based on the share of subsidiaries organized as limited liability companies or partnerships in firms' 10-K Exhibit 21 filings (Feng et al., 2009). The identifying assumption is not that SPV usage is randomly assigned, but that firms with more SPV-based debt are more exposed to the legal change. Among low-productivity Delaware firms, those with greater pre-reform SPV reliance experience a larger debt contraction, consistent with the reform operating through the intended channel.[19]

Finally, we document that the debt contraction has real consequences. Column (6) replaces the outcome variable with log real property, plant, and equipment. The contraction for low-productivity firms translates into reduced real investment essentially one-for-one in log points, indicating that the reallocation of credit shows up in the reallocation of physical capital.

[19]Pre-reform SPV usage cannot identify effects on productive firms, since SPVs represent *existing* debt. Productive firms would be expected to increase SPV usage *after* the reform, and to do so uniformly, leaving no within-Delaware control group.

Table 2: Creditor Rights, Firm Productivity, and Capital Allocation

	(1) Baseline	(2) Risky Sample	(3) Safe Sample	(4) Q-Based	(5) Within Delaware	(6) Real Investment
Stronger CR	-0.151**	-0.407**	0.139	-0.122**	-0.287*	-0.155***
	(0.073)	(0.184)	(0.238)	(0.062)	(0.160)	(0.045)
Stronger CR × Productivity	0.254*	0.938***	0.155	0.201*		0.258***
	(0.140)	(0.357)	(0.416)	(0.117)		(0.087)
Controls	✓	✓	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓	✓	✓
Sector × Time FE	✓	✓	✓	✓	✓	✓
R^2	0.924	0.937	0.943	0.925	0.915	0.977
R^2 (within)	0.006	0.014	0.017	0.010	0.023	0.040
Observations	51332	8912	5427	75410	8254	51171

Notes: The table presents regression estimates of Equation (7). Controls include firm productivity measured by its percentile in the cross-sectional distribution of $MRPK_{f,q}$; its size measured by its percentile in the cross-sectional distribution of total book assets; and its market leverage. All controls are measured in the last quarter of 2001. Column (2) restricts the estimation sample to risky firms as measured by a quarterly probability of default exceeding 0.0001%. This threshold corresponds roughly to the median default probability of firms rated BB- in the subsample of rated firms. Column (3) restricts the estimation sample to safe firms as measured by a quarterly probability of default below 0.0001%. Column (4) measures $a_{f,2001q4}$ as the firms' percentile in the cross-sectional distribution of Tobin's Q in the last quarter of 2001. Column (5) restricts the sample to Delaware firms with below-median $MRPK_{f,q}$, drops the interaction term $l_{f,2001q4} \times a_{f,2001q4}$ and defines firms exposed to the reform as $l_{f,2001q4} = \mathbb{1}(\text{SPV share}_{f,2001q4} > 0.5)$, where $\text{SPV share}_{f,2001q4}$ is the share of subsidiaries that are potential SPVs according to Feng et al. (2009). Column (6) substitutes the dependent variable as log real plant, property and equipment. Standard errors shown in brackets are clustered on the level of firms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

6 Creditor Rights and the Incidence of Credit Booms

Do creditor rights matter only for how credit booms unfold, or also for whether they occur in the first place? 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.

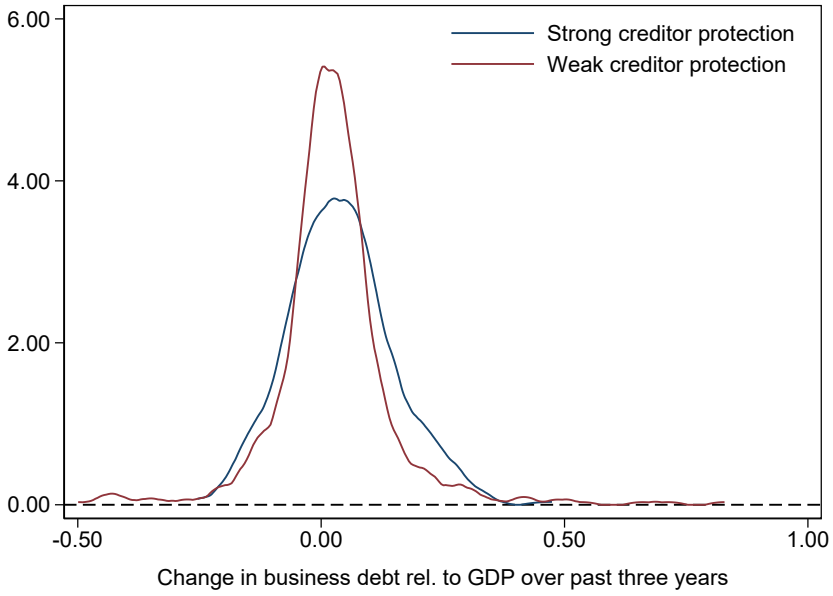
Countries with strong creditor rights experience more frequent and larger credit booms, consistent with a credit supply expansion that outweighs any offsetting effect on borrower discipline. These booms also unfold differently. Where creditor rights are strong, credit responds more strongly to productivity shocks, and bankruptcies are resolved earlier in the cycle rather than delayed until the bust. Where rights are weak, booms are fewer and smaller, yet their aftermath is far

worse: reallocation stalls, banks continue lending to distressed borrowers, and GDP losses persist. Strong creditor rights are thus associated with more "productive" booms that, despite occurring more often, 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 6 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.

Figure 6: 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, $L_{i,t} = 1$ ($L_{i,t} = 0$).

Beyond frequency, we next 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 $h \in \{1, 2, ..., 6\}$:

$$\begin{aligned}\Delta_h c_{i,t+h} = \alpha_{i,h} + \beta_{1,h}\mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \\ + \beta_{2,h}\Big(\mathbb{1}(\Delta_3 c_{i,t+4} > 0.05) \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \boldsymbol{\gamma}_h \boldsymbol{x}_{i,t} + e_{i,t}\end{aligned} \tag{8}$$

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 (1). To condition on a boom occurring, we focus on episodes where the business credit to GDP ratio increased at least by 5 percentage points over three years. Conditional on this threshold being surpassed, the average increase in this ratio is about 10 percentage points, the value to which we calibrate the impulse response functions in Section 4. The vector of controls $\boldsymbol{x}$ includes the contemporaneous 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 7a 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, and yet with 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

How can stronger creditor rights be associated with larger and more frequent booms, yet also with softer landings? If creditor rights merely expanded credit indiscriminately, we would expect larger booms to be followed by *worse* outcomes, not better. To reconcile these patterns, it is important to consider the composition of credit. If creditor rights facilitate credit flows tracking underlying productivity, larger booms reflect the financing of genuine investment opportunities. We test this directly by examining how credit responds to total factor productivity shocks across creditor rights regimes.

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

$$\Delta_h c_{i,t-1+h} = \alpha_{i,h} + \beta_{1,h}\Delta A_{i,t} + \beta_{2,h}\Big(\Delta A_{i,t} \times L_{i,t}\Big) + \beta_{3,h} L_{i,t} + \gamma_h \boldsymbol{x}_{i,t} + e_{i,t} \tag{9}$$

where $c_{i,t}$ is the business debt-to-GDP in country i and year t, $A_{i,t}$ is the natural logarithm of aggre-

gate total factor productivity and $L_{i,t}$ is the composite creditor rights index defined in Equation (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 7b shows a clear divergence in the impulse response of credit to productivity innovations. A 5 percentage point increase 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.

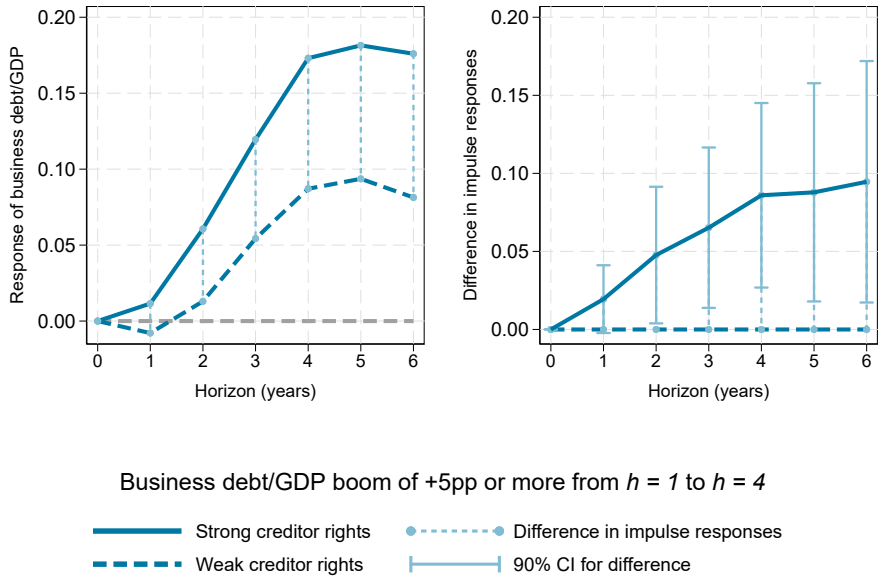
These patterns suggest that strong creditor rights facilitate the allocation of credit in the economy. When productive opportunities arise, credit supports them more readily under strong creditor protection, as creditors' ability to enforce claims and recover value in case of default may encourage the financing of productivity-enhancing but risky investments. Weak creditor rights, however, may constrain growth in credit if banks facing poor recovery prospects become overly conservative. As such, weak creditor protection can be viewed as a financial friction that prevents the efficient allocation of capital.

6.3 Characteristics of Credit Booms

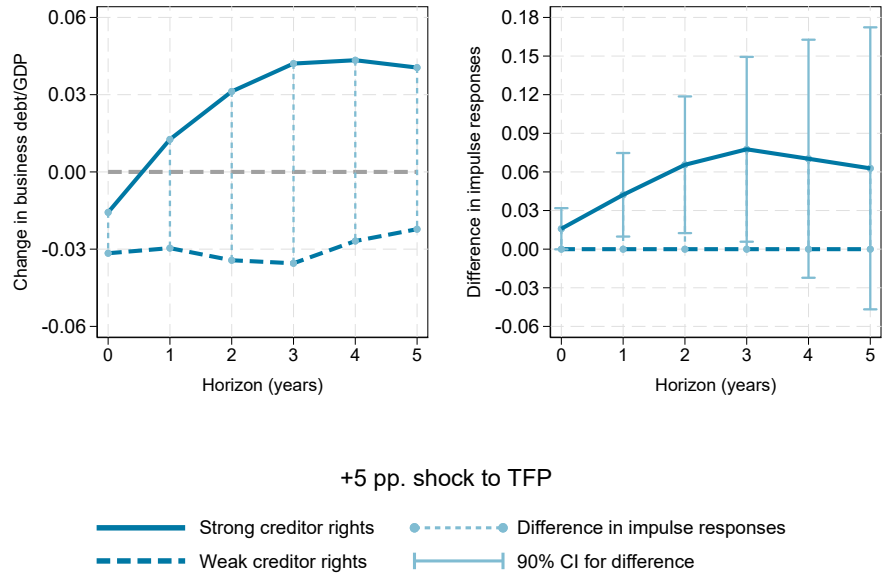
The evidence so far suggests that credit booms in strong-creditor regimes are different: they are larger, more responsive to productivity, and followed by milder downturns. Table 3 examines several additional features of these booms directly, relating the size of the credit expansion, and its interaction with creditor rights, to three-year changes in investment, the sectoral allocation of credit, corporate credit spreads, bank capitalization, high-yield issuance, and measures of borrower and bank risk. Consistent with more aggressive risk-taking where creditors are strong, credit expansions under stronger creditor rights are associated with somewhat of an increase in borrowers' default risk and, more tentatively, with greater high-yield issuance and higher bank risk. Together with the evidence on productivity in Section 6.2 and the milder downturns documented in Section 4, these patterns suggest that strong creditor rights produce booms that are simultaneously more productive, more risk-taking, and more efficient at resolving distress.

Figure 7: 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 (8). 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.

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

The increase in risk-taking is accompanied by an earlier resolution of the resulting distress. Appendix Figure B.13b plots the impulse response of bankruptcy filings during a credit boom. Where creditor protections are strong, countries experience increases in bankruptcy filings during boom periods rather than the bust phase. This pattern suggests that stronger creditor protection facilitates early identification and resolution of failing projects, preventing the accumulation of distressed firms on bank balance sheets 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) and a more efficient reallocation of resources.

7 Conclusion

Do stronger creditor rights amplify or dampen the macroeconomic risks of credit booms? From a theoretical perspective, the answer is ambiguous. The *amplification view* holds that strong creditor rights fuel excessive leverage that amplifies shocks and triggers disruptive liquidations when the boom turns to bust. The *dampening view* holds that well-protected creditors are better positioned to discipline borrowers during expansions and to enforce efficient reallocation when defaults materialize. 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 economies with strong creditor protections experience substantially milder outcomes.

Table 3: Creditor Rights and the Correlates of Credit Expansions

	Investment/ GDP	Share of NT Sector Debt	Corporate Credit Spread	Bank Capital Ratio	High Yield Share	Borrower Risk (Leverage)	Borrower Risk (PD)	Bank Risk
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ_3 Business Debt/GDP	-6.161***	0.027	0.087	-0.971	-0.688	-2.011*	-2.070*	-1.837
	(1.337)	(0.023)	(1.986)	(0.727)	(15.511)	(1.128)	(1.169)	(2.124)
Creditor Rights (percentile)	-0.625	0.006	-0.233	-0.187	-3.508	-0.192	0.022	-0.050
	(0.432)	(0.004)	(0.196)	(0.140)	(3.396)	(0.239)	(0.178)	(0.362)
Δ_3 Business Debt/GDP $\times$ Creditor Rights	3.312	-0.002	1.160	0.786	16.333	1.732	2.390*	1.476
	(2.241)	(0.032)	(2.413)	(0.890)	(20.966)	(1.716)	(1.335)	(2.719)
Observations	805	486	432	712	614	619	583	497
Within R^2	0.061	0.026	0.009	0.008	0.004	0.008	0.005	0.004

Notes: This table reports how the three-year change in each outcome variable (listed in the column headers) is associated with an expansion in business credit and its interaction with creditor rights. Each column reports estimates from the panel regression

$$\Delta_3 y_{i,t} = \gamma_i + \beta_1 \Delta_3 c_{i,t} + \beta_2 \left(\Delta_3 c_{i,t} \times L_{i,t}\right) + \beta_3 L_{i,t} + e_{i,t},$$

where $y_{i,t}$ is the outcome named in the column header for country i in year t, Δ_3 denotes the three-year change, γ_i are country fixed effects, $c_{i,t}$ is the business debt-to-GDP ratio, and $L_{i,t}$ is the creditor-rights index (in percentiles) defined in Equation (1). The rows report $\hat{\beta}_1$, the response of the outcome to a credit expansion; $\hat{\beta}_3$, the level effect of creditor rights; and $\hat{\beta}_2$, the interaction. Standard errors clustered at the country level are reported in parentheses, and the last two rows report the number of observations and the within-R^2. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

We present evidence that stronger creditor rights help to redirect capital away from unproductive borrowers and toward viable ones in the aftermath of a boom. In the macro data, sectoral credit reallocation slows under weak creditor-rights regimes, and what reallocation occurs becomes decoupled from productivity. Moreover, risky firms continue to borrow at compressed spreads—a pattern consistent with continued lending to distressed borrowers. In firm-level data, Delaware's adoption of antirecharacterization laws in January 2002 provides causal evidence for the mechanism: the reform strengthened secured creditors' claims on SPV collateral, leading low-productivity firms to contract debt by roughly fifteen percent relative to comparable firms outside Delaware, while high-productivity firms expanded borrowing. The debt reduction translated one-for-one into reduced capital investment, indicating that the reallocation of credit has direct real consequences.

Our findings also provide a new perspective on why credit booms are often followed by deep recessions. While the existing literature has emphasized the importance of financial fragility, our evidence points to misallocation and legal frictions as a critical factor. Where creditors have limited rights to foreclose on and liquidate distressed borrowers, credit continues to prop up less productive firms, resulting in a misallocation of capital. The legal rights of creditors thus shape not only access to credit but also business cycle fluctuations.

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Online Appendix

Credit Cycles and Creditor Rights

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

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Appendix A Model of Creditor Rights and Credit Allocation

A.1 Overview

The model illustrates how lending under weak creditor rights can precipitate misallocation. It helps to rationalize the evidence that credit expansions are followed by less reallocation of credit and lower output where the degree of creditor protection is limited.

We consider ex-ante identical firms that require credit to invest. The productivity of the project firms invest in is ex-ante uncertain but differs across firms ex-post. Firms that end up defaulting undergo a bankruptcy process in which capital is liquidated and the total value distributed among debtor and creditors, depending on the strength of "creditor rights".

The model captures two fundamental channels through which stronger creditor rights can improve the allocation of capital. First, they ease financing constraints, allowing productive projects to operate at a larger scale ("credit access channel"). Second, they facilitate more aggressive liquidations among unproductive projects ("liquidation channel").

Neither of the two channels operates when firms' borrowing constraints are not binding. Thus, they are especially consequential after firms have levered up during credit boom episodes.

Exogenous variables

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

$t \in \{1,2\}$: Index of points in time

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

Endogenous variables

$k_f \geq 0$: Capital goods 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

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, as well as a representative, deep-pocketed, all-equity bank. 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 and will not downsize unless forced by creditors, consistent with private benefits of control.

At time 1, firms are identical and can draw on internal equity endowment ϵ and bank credit b_f for investment k_f. Productivity for production at time 2 is uncertain and heterogeneously distributed across firms according to a commonly known distribution F with support $[0, \bar{a}]$ and finite first moment.

$$a_f \sim F \tag{A.1}$$

Ex-post restructuring When uncertainty about productivity resolves, firms may have to undergo bankruptcy—i.e., operational and financial restructuring. Bankruptcy shrinks the firm to its ex-post optimal scale at no cost and sells excess capital goods at face value,[20] generating

$$B(a_f, k_f) = a_f \tilde{k}^\alpha + (k_f - \tilde{k}) \tag{A.2}$$

$$\text{where} \quad \tilde{k} = \arg\max_{k \leq k_f} a_f k^\alpha - k \tag{A.3}$$

[20] Introducing liquidation discounts leaves general conclusions unchanged.

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:

$$B_b(a_f, k_f, b_f) = \min\left\{\kappa B(\cdot),\ b_f\right\} \tag{A.4}$$

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:

$$X(a_f, k_f, b_f) = \mathbb{1}\left[a_f k_f^{\alpha} < B_b(\cdot)\right] \tag{A.5}$$

Firm's problem Anticipating ex-post restructuring outcomes at time 2, 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 prevent the bank to index the price of debt q_f to firm investment. To contain the resulting moral hazard, creditors set a credit constraint $\bar{b}_f$.

$$\max_{k_f \geq 0} \epsilon - k_f + q_f b_f + \mathbb{E}\Big[\Big(1 - X(\cdot)\Big)\max\left\{a_f k_f^{\alpha} - b_f), 0\right\} + X(\cdot)\Big(B(\cdot) - B_b(\cdot)\Big)\Big] \tag{A.6}$$

s.t.

$$\epsilon - k_f + q_f b_f \geq 0 \tag{A.7}$$

$$b_f \leq \bar{b}_f \tag{A.8}$$

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

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

$$q_f = 1\ \forall f \tag{A.9}$$

$$\bar{b}_f = \kappa B\Big(0, k_f^*(\bar{b}_f, q_f)\Big) = \kappa k_f^*(\bar{b}_f) \tag{A.10}$$

Planner's problem The planner faces uncertainty regarding future firm productivity, but can invest without financial frictions: That is, firms can fully fund investment with equity and will be restructured ex post whenever $a_f k_f^\alpha < B(a_f, k_f)$. The planner's problem thus reads:

$$\max_{k_f \geq 0} -k_f + \mathbb{E}\Big[\max\{a_f k_f^\alpha, B(a_f, k_f)\}\Big] \tag{A.11}$$

A.3 Model implications

A.3.1 Analytical solution

Because firms are ex-ante identical in equity endowment and investment 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.[21] When the credit constraint binds, investment is $k^*(\bar{b}) = \bar{b} - \epsilon$. Plugging this into (A.10) and rearranging yields

$$\bar{b} = \frac{\kappa}{1-\kappa}\epsilon \tag{A.12}$$

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

$$k^* = \frac{\epsilon}{1-\kappa} \tag{A.13}$$

$$X(a, k^*, \bar{b}) = \mathbb{1}\Big[a_f < \kappa\Big(\frac{\epsilon}{1-\kappa}\Big)^{1-\alpha}\Big] \tag{A.14}$$

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.*

[21] This is because $\bar{b}|_{\kappa=0} = 0$ as per (A.10).

Lemma A.1 implies that higher κ increases aggregate capital before liquidations. Lemma A.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.

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 $\bar{a}{k^*_{\text{free}}}^{\alpha} = k^*_{\text{free}} - \epsilon$.[22]

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 $[0, \bar{a}]$:

$$\frac{a_f}{\bar{a}} \sim B(4,4) \tag{A.15}$$

Moreover, we set $\bar{a} = 1$, $\alpha = 2/3$ and $\epsilon = 0.02$ and contrast model solutions for $\kappa \in \{0.6, 0.8\}$.[23]

Figure A.1 illustrates how the distribution of firm size and marginal products of capital (MPK)

[22] 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.

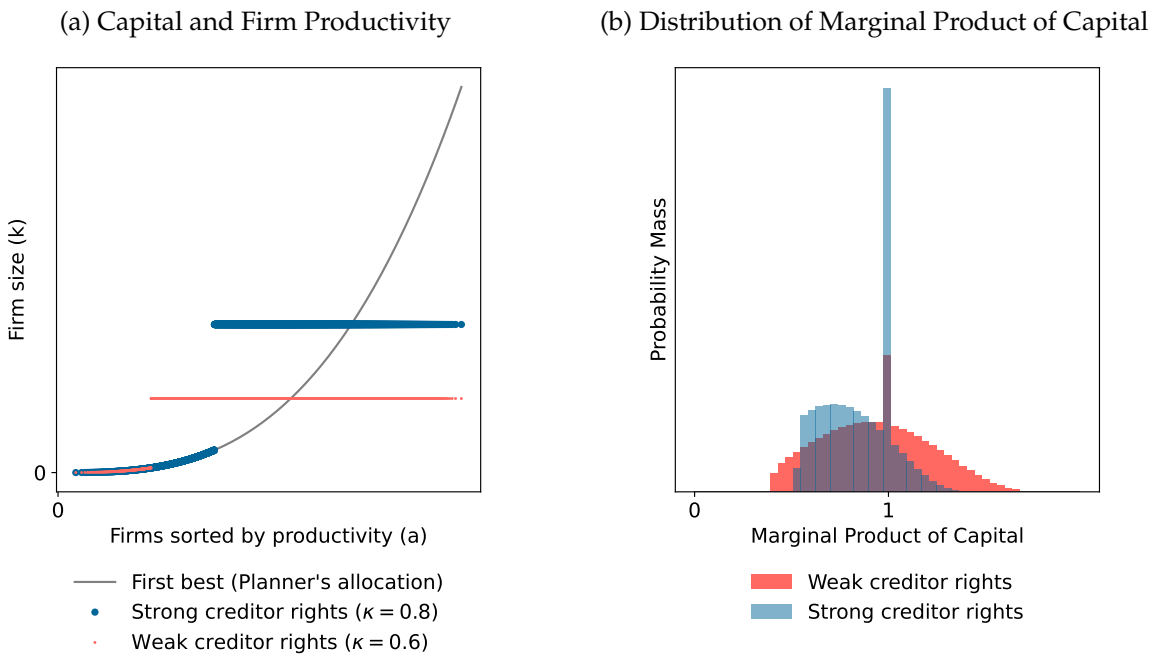
[23] Results are qualitatively identical when choosing other reference points for κ as long as firms remain credit constrained. Moreover, parameter values guarantee $\arg\max_k \mathbb{E}[a_f]k^{\alpha} > \epsilon$; or equivalently expected marginal product of capital at $k = \epsilon$ to be greater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

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).

How do the allocative effects change aggregate output? Figure A.2 compares the aggregate economic value in the model at time 2 between both calibrations, and decomposes the relative importance of the liquidation and credit access channels.[24] 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. Overall, both channel are quantitatively relevant, with the liquidation channel gaining in importance in this model for higher levels of creditor protection.

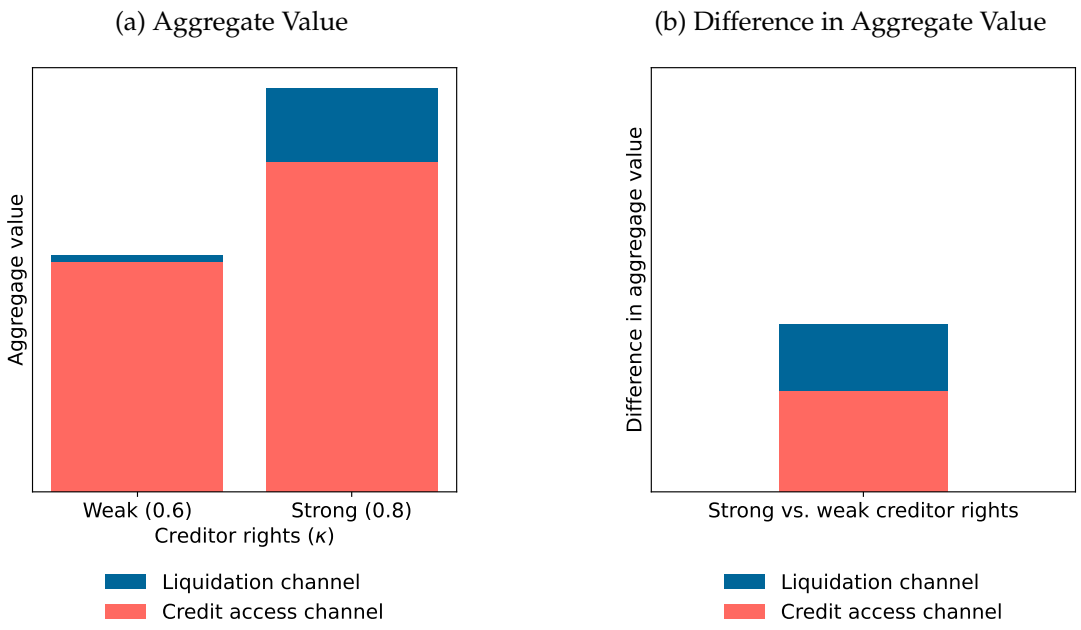
[24] Both channels interact: More investment is possible *because* of the prospect of more efficient liquidations. So alternative defensible compositions of aggregate effects between both channels are conceivable.

Figure A.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 plots 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 weaker creditor rights ($\kappa = 0.6$) is shown in red.

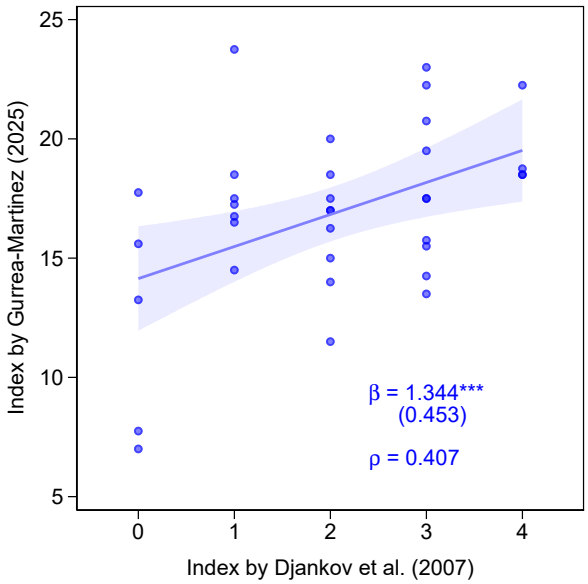
Figure A.2: Composition of Aggregate Value Under Strong and Weak Creditor Rights



Notes: This figure compares the aggregate value in the economy at time 2 across legal regimes and decomposes it into components the two effects highlighted in Lemma A.1 and Lemma A.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 to the value from efficiently liquidated capital.

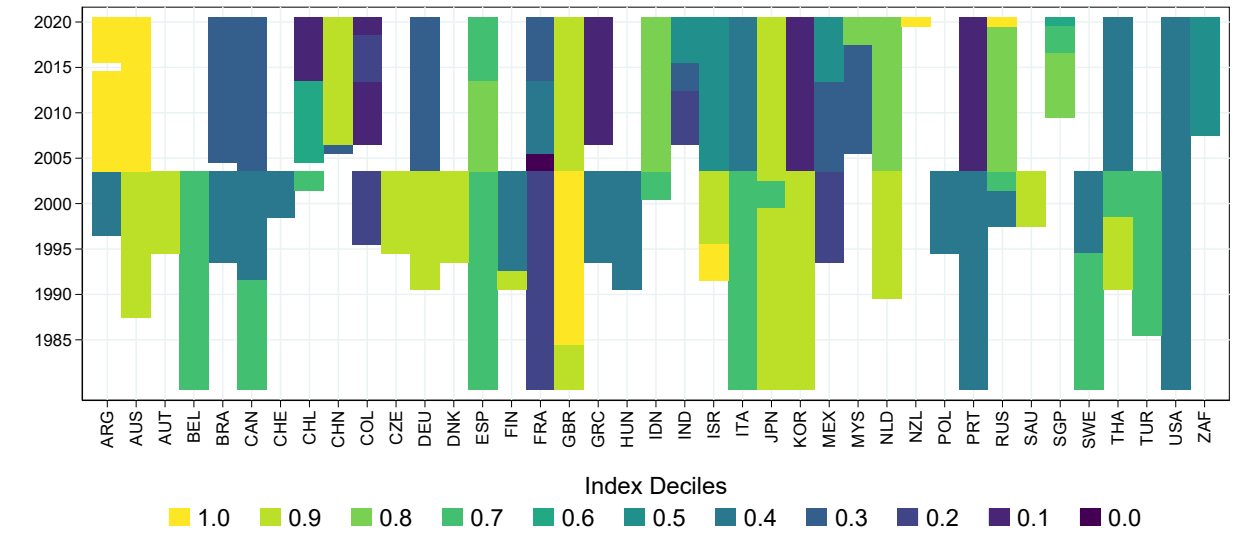
Appendix B Additional Evidence

Figure B.1: Correlation Between Creditor Rights Indices



Notes: This figure plots a scatter plot showing the correlation between the creditor rights indices 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 B.2: Percentile Ranks of Creditor Rights Indices across Estimation Sample



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

Table B.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.

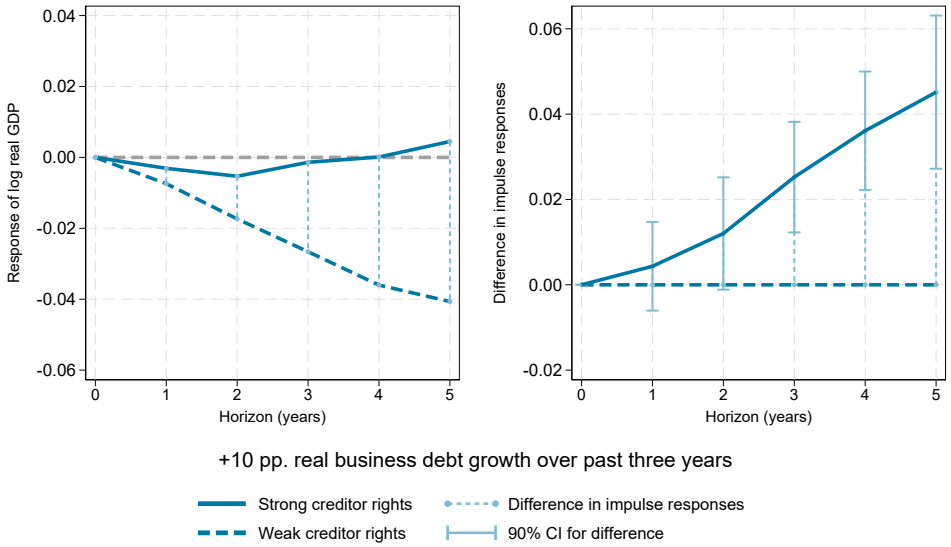
Table B.2: Estimates of Local Projection Using Equation (4)

	(1) $h=1$	(2) $h=2$	(3) $h=3$	(4) $h=4$	(5) $h=5$
Δ_3Business total debt rel. to GDP (decimal) $\times$ 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

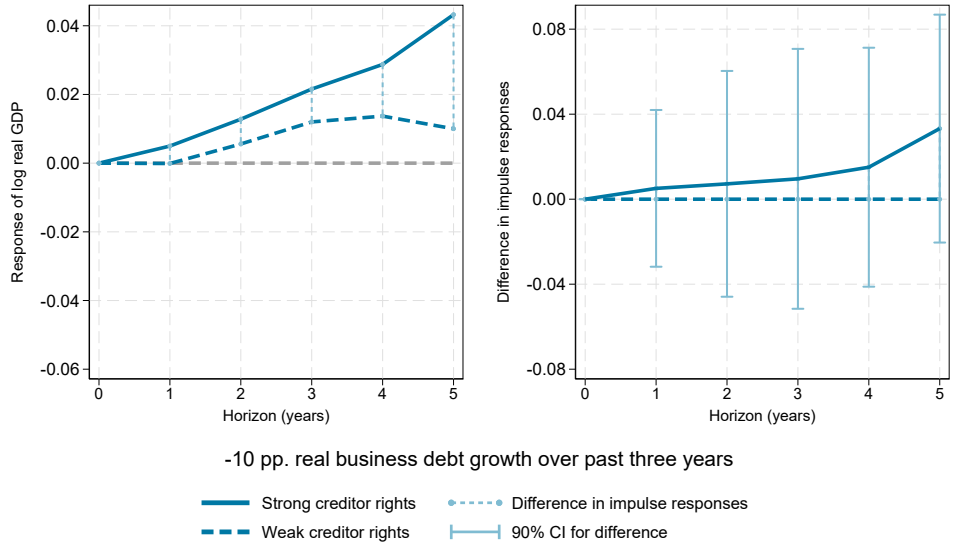
Notes: The table shows estimates from the local projection regressions of equation (4). Discroll-Kraay standard errors in parentheses. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$.

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

(a) Credit Expansion



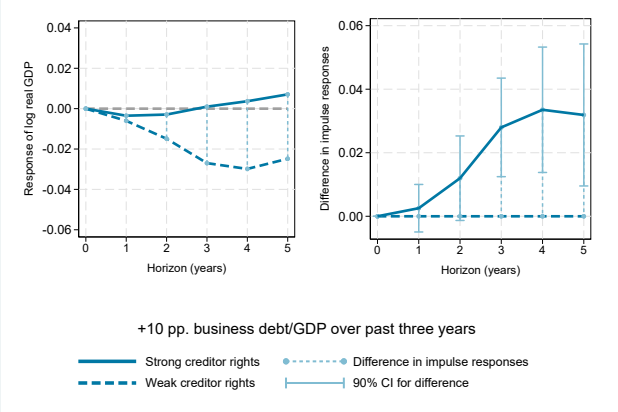
(b) Credit Contraction



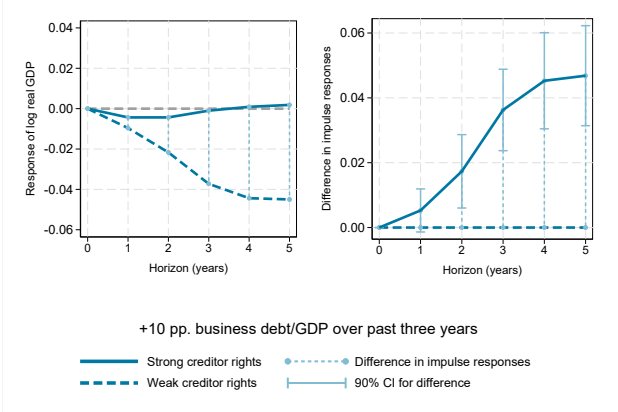
Notes: This figure visualizes estimates from state-dependent local projections with sign asymmetry in the spirit of Ben Zeev et al. (2023) using a binary variable which indicates if the three-year change of log real business credit is positive. We use real debt growth rather than the change in the corresponding GDP ratio to distinguish between booms and busts based on variation in debt rather than GDP. Panel (a) shows estimates for credit expansions; Panel (b) for credit contractions. Within each panel, the left graph plots the impulse response of real GDP under strong creditor rights (solid line) and under weak creditor rights (dashed line). The right graph plots the difference with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

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

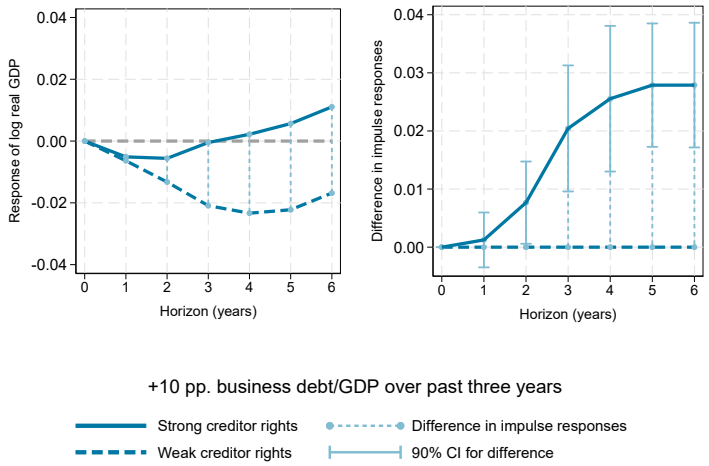
(a) Controlling for Economic Development



(b) Controlling for Financial Development



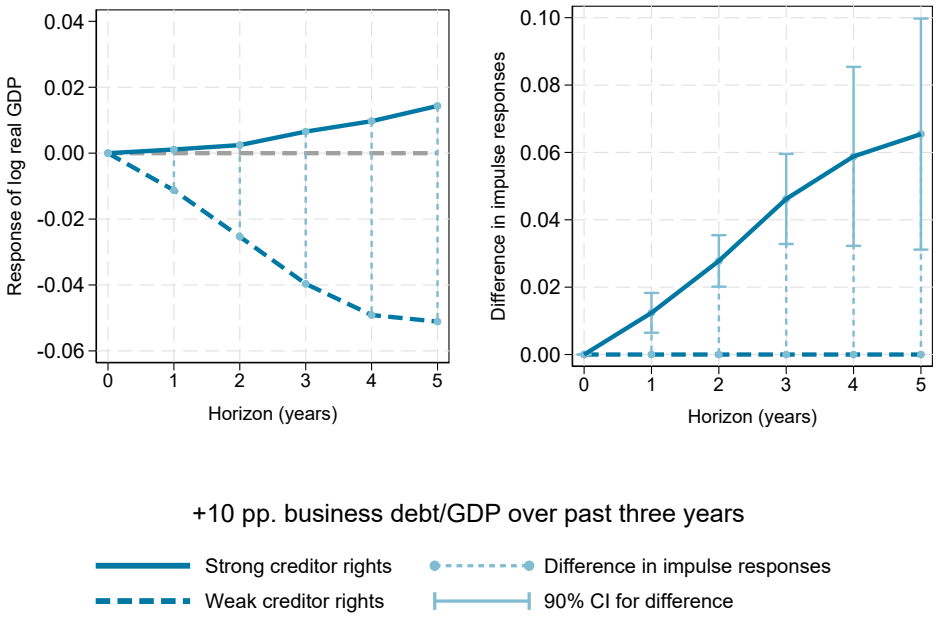
(c) Controlling for Bankruptcy Efficiency



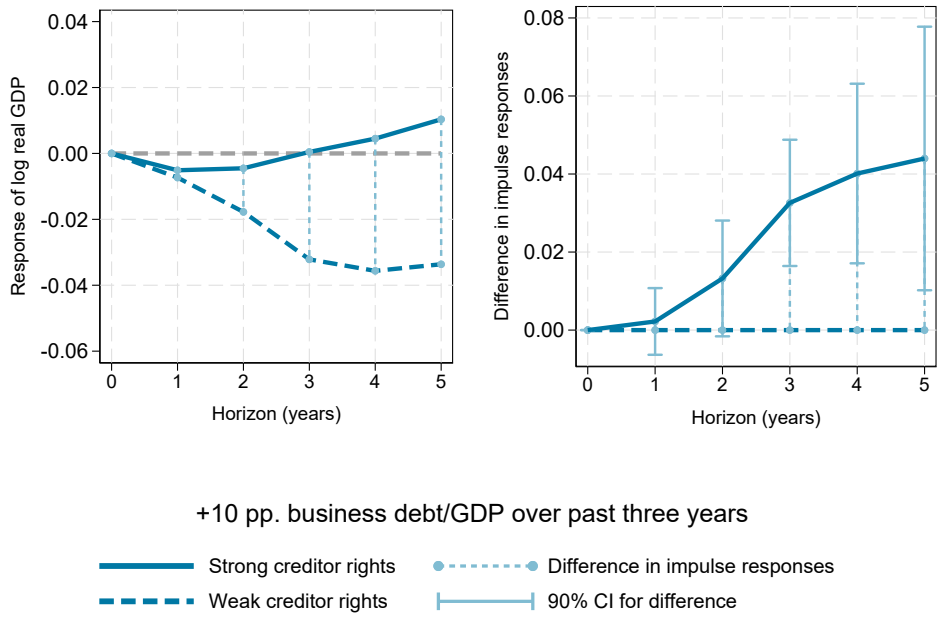
Notes: This figure visualizes estimates from the local projection equation (4) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for log GDP in real US Dollar and its interaction with $\Delta_3 c_{i,t}$. Panel (b) controls for the 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 left 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 right 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 B.5: Creditor Rights and Real GDP after Business Credit Booms: Development Status

(a) Advanced Economies

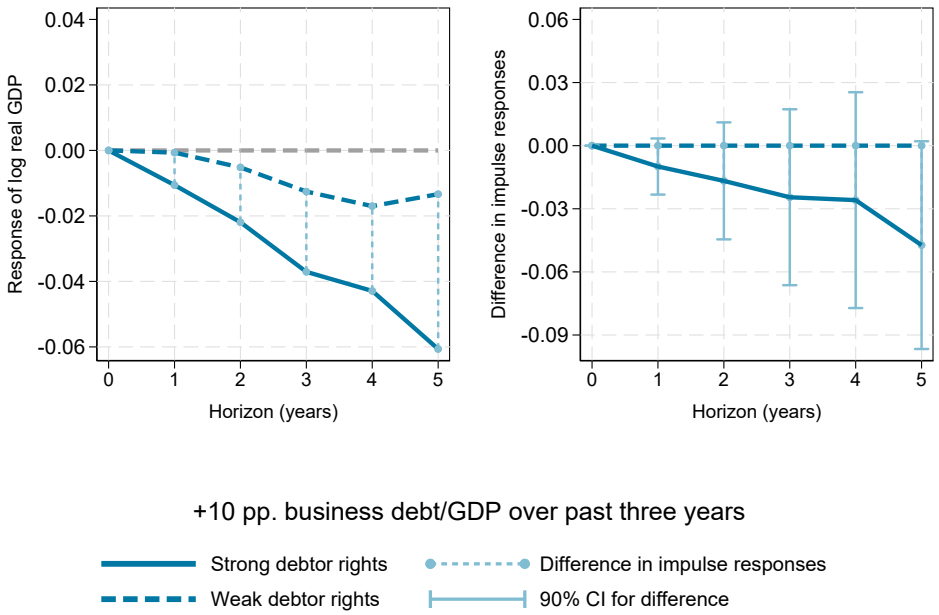


(b) Emerging Economies



Notes: This figure visualizes estimates from the local projection equation (4) 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 (4) obtained in the subsample of advanced economies. Panel (b) shows estimates of Equation (4) obtained in the subsample of emerging market economies. Within each panel, the left 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 right 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.

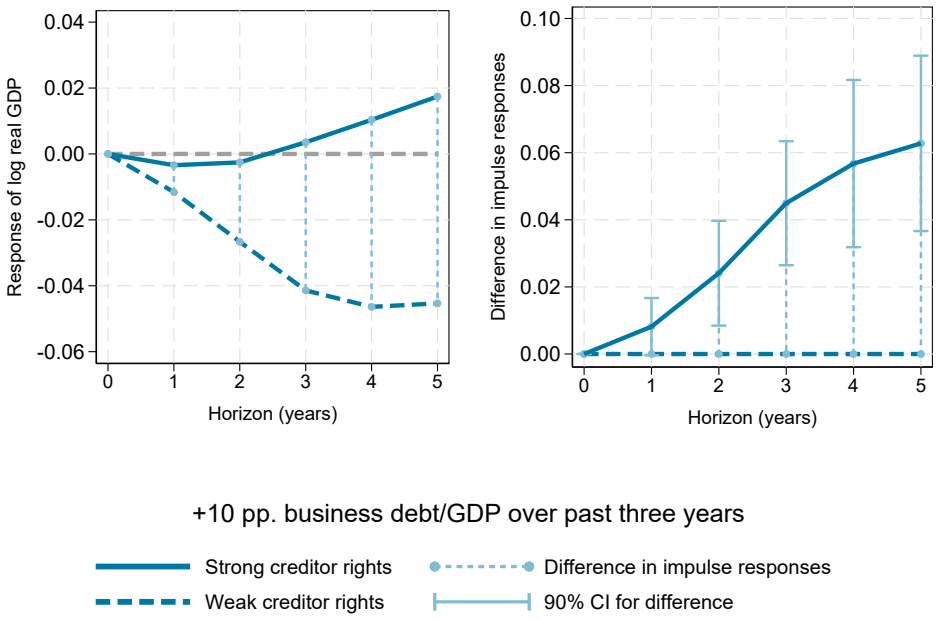
Figure B.6: Debtor Rights and Real GDP After Business Credit Changes



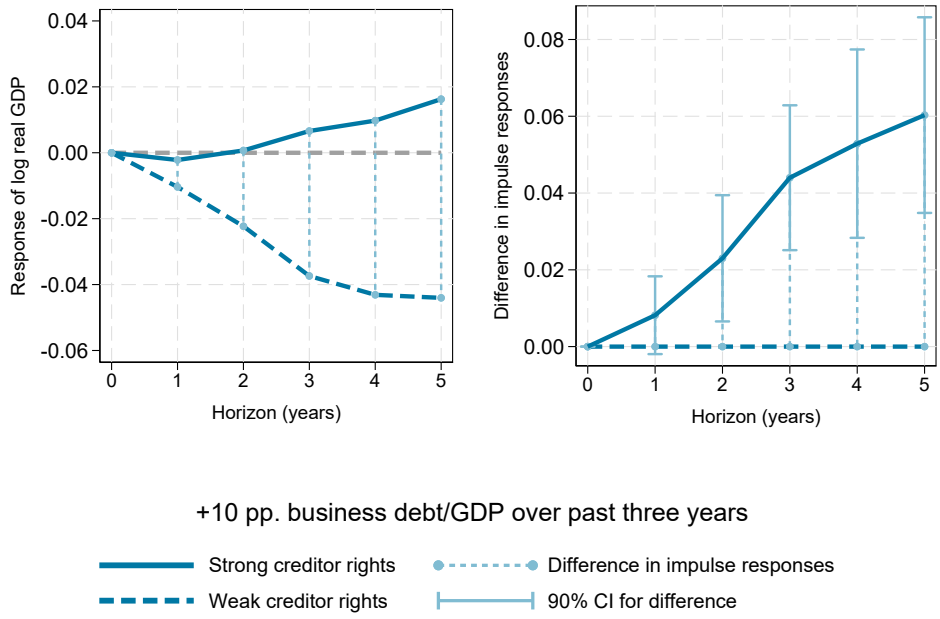
Notes: This figure visualizes estimates from the local projection equation (4) but replacing $L_{i,t}$ by the index of *debtor* friendliness from Gurrea-Martinez (2025). The left panel plots the impulse response in real GDP to a 10 percentage points increase in the business debt to GDP ratio over the 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 maximum (minimum) value of the index attained in the sample. The right panel plots the difference between those impulse responses, with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

Figure B.7: Creditor Rights and Real GDP, Controlling For Boom Characteristics

(a) Real Estate Debt Share



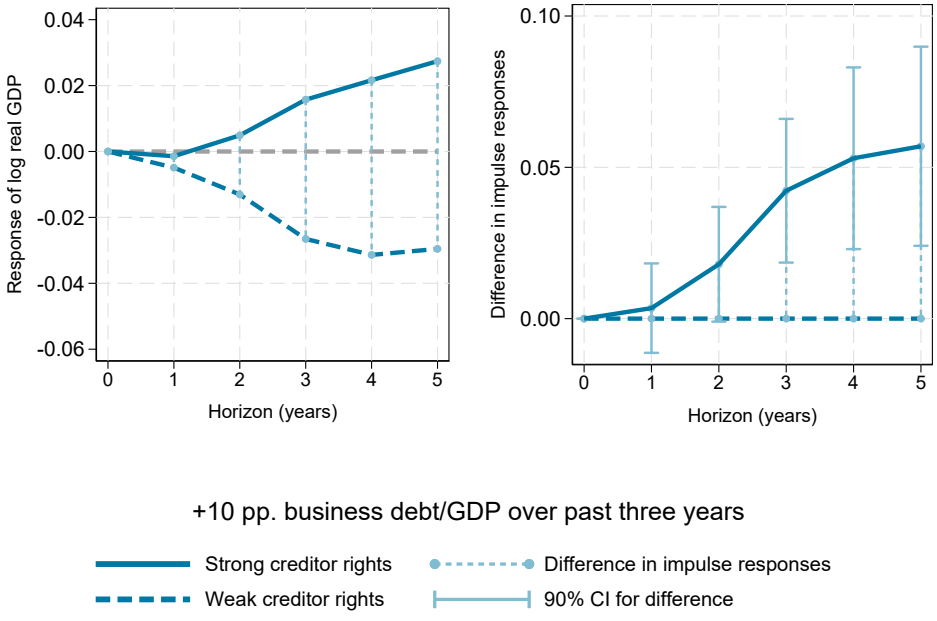
(b) High Yield Share



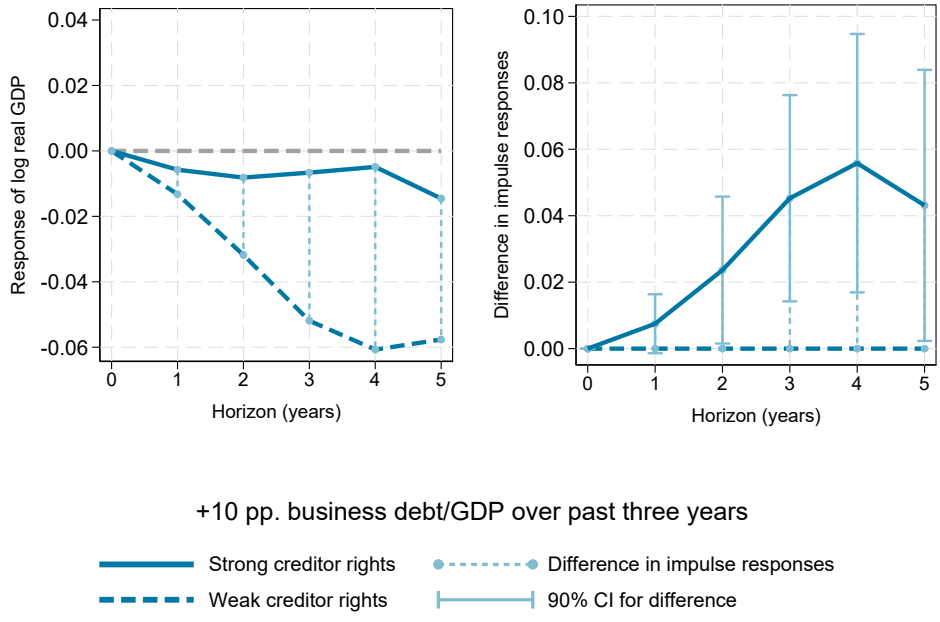
Notes: This figure visualizes estimates from the local projection equation (4) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) controls for the share of credit to real estate and construction and its interaction with $\Delta_3 c_{i,t}$. 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 left 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 right 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 B.8: Creditor Rights and Real GDP after Business Credit Changes: Other Measures

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



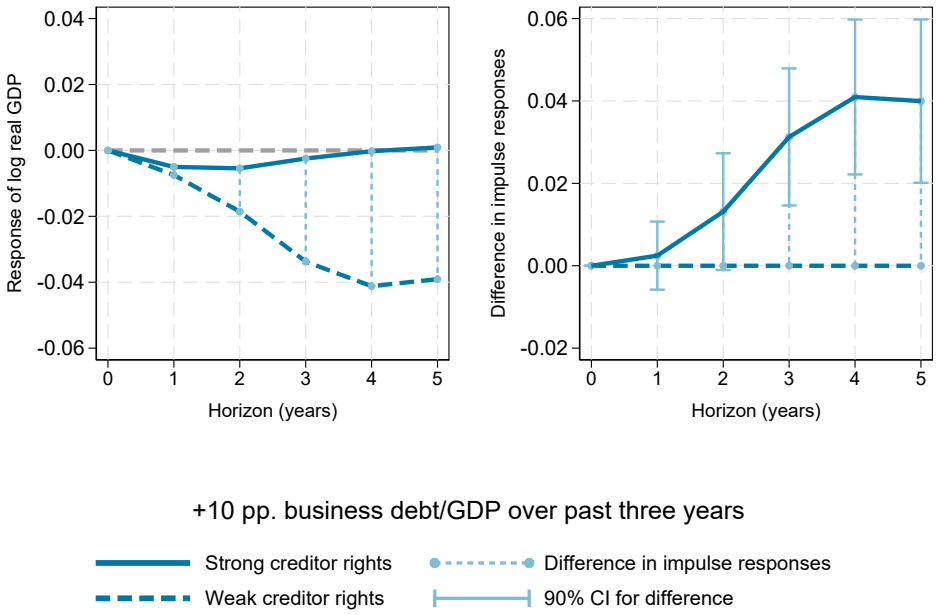
(b) Index and subsample of Gurrea-Martinez (2025)



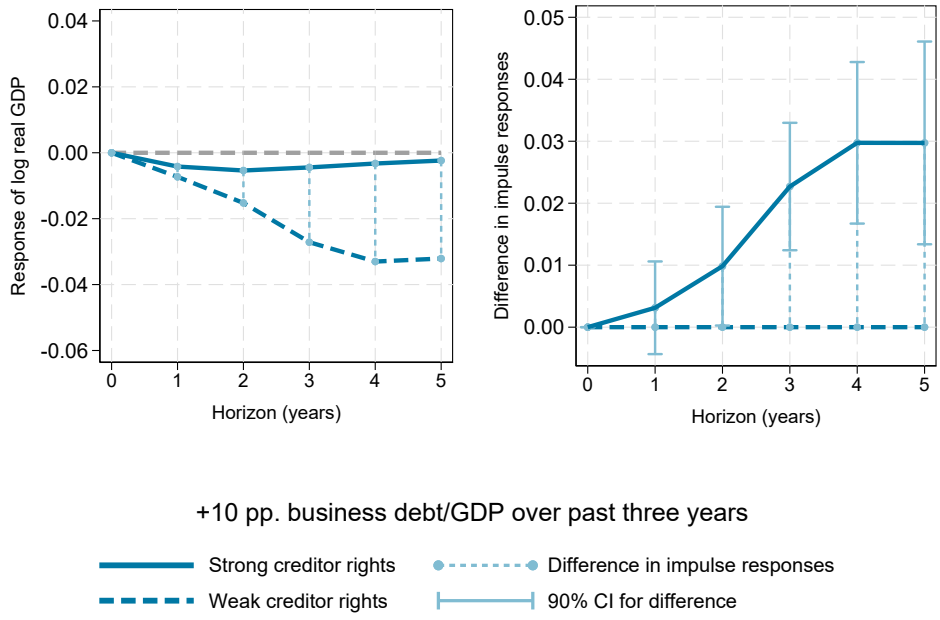
Notes: This figure visualizes estimates from the local projection equation (4) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates using only the index of Djankov et al. (2007). Panel (b) shows estimates using only the index of Gurrea-Martinez (2025). Within each panel, the left 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 right graph plots the difference between those impulse responses with corresponding 90% confidence intervals based on Discroll-Kraay standard errors.

Figure B.9: Creditor Rights and Real GDP after Business Credit Changes: Alternative Indices

(a) Index Based on Weakest Protection for Secured Creditors



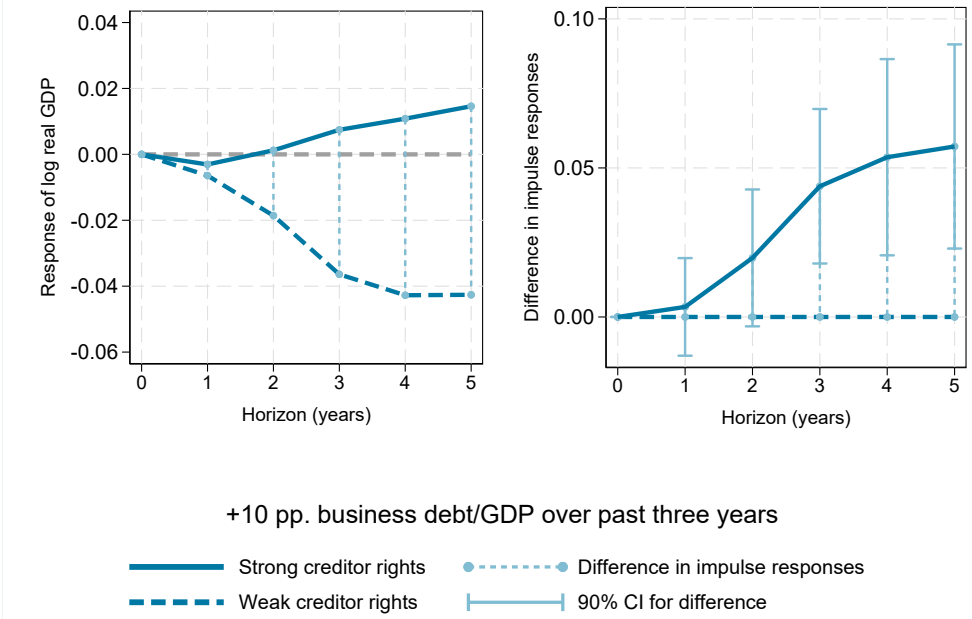
(b) Index Based on Strongest Protection for Secured Creditors



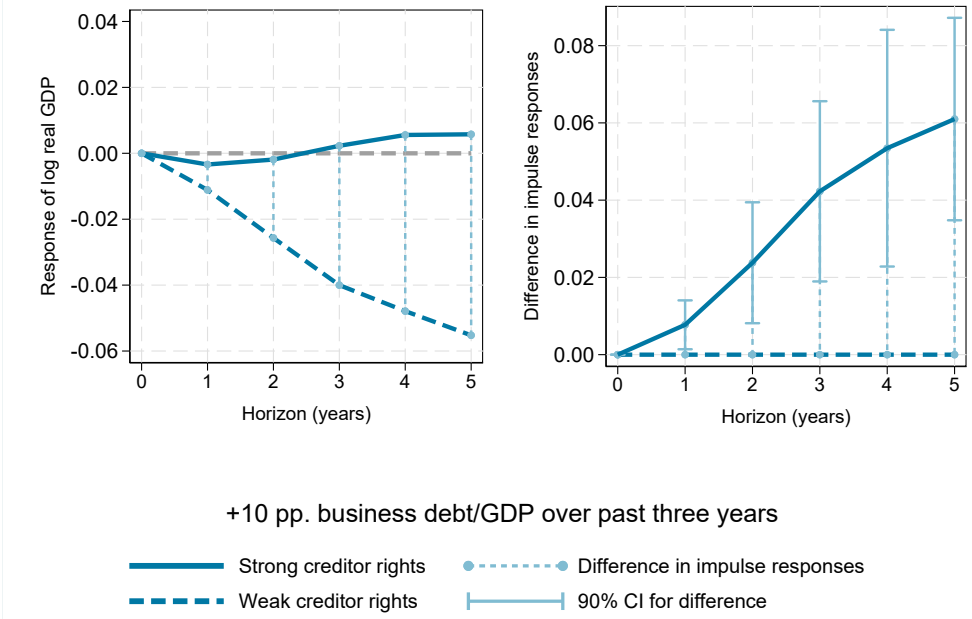
Notes: This figure reports estimates from the local projection equation (4), based on a 10 percentage point increase in the business debt-to-GDP ratio over the preceding three years. When multiple bankruptcy procedures are available in a given country-year, we select alternative indices from Gurrea-Martinez (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 left plot shows the impulse response of real GDP for strong (solid line) and weak (dashed line) creditor rights. The right plot shows the difference between these impulse responses, along with 90% confidence intervals based on Driscoll–Kraay standard errors.

Figure B.10: Creditor Rights and Real GDP after Business Credit Changes: Pre- and Post-2003

(a) Before 2003



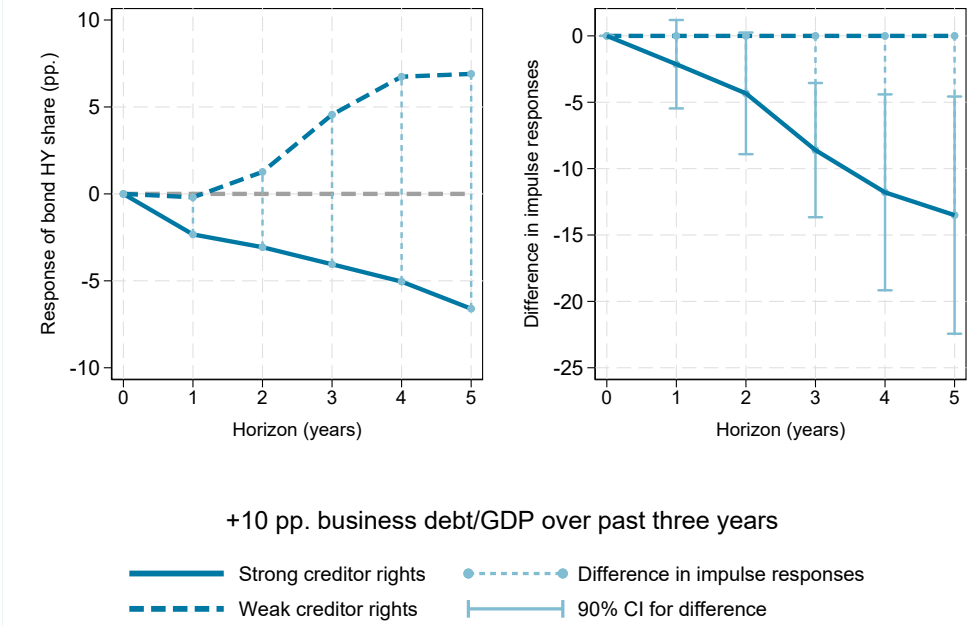
(b) After 2003



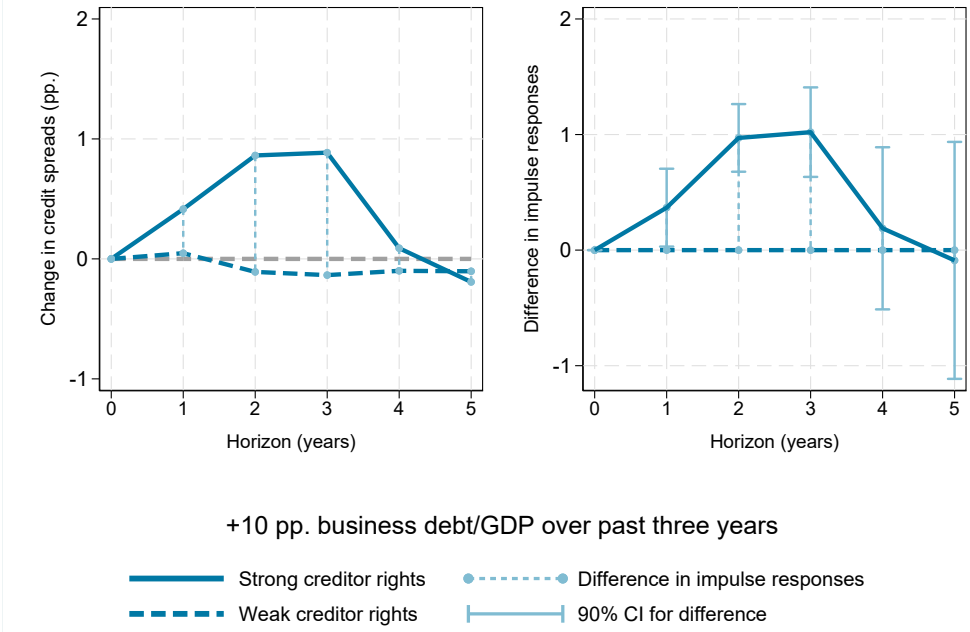
Notes: This figure visualizes estimates from the local projection equation (4) for a 10 percentage points increase in the business debt to GDP ratio over the preceding three years. Panel (a) shows estimates of Equation (4) obtained in the subsample running up until and including 2003 – the median year in our sample. Panel (b) shows estimates of Equation (4) obtained in the subsample starting 2004. Within each panel, the left 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 right 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 B.11: Volume and Pricing of Risky Credit

(a) Credit to Risky Firms

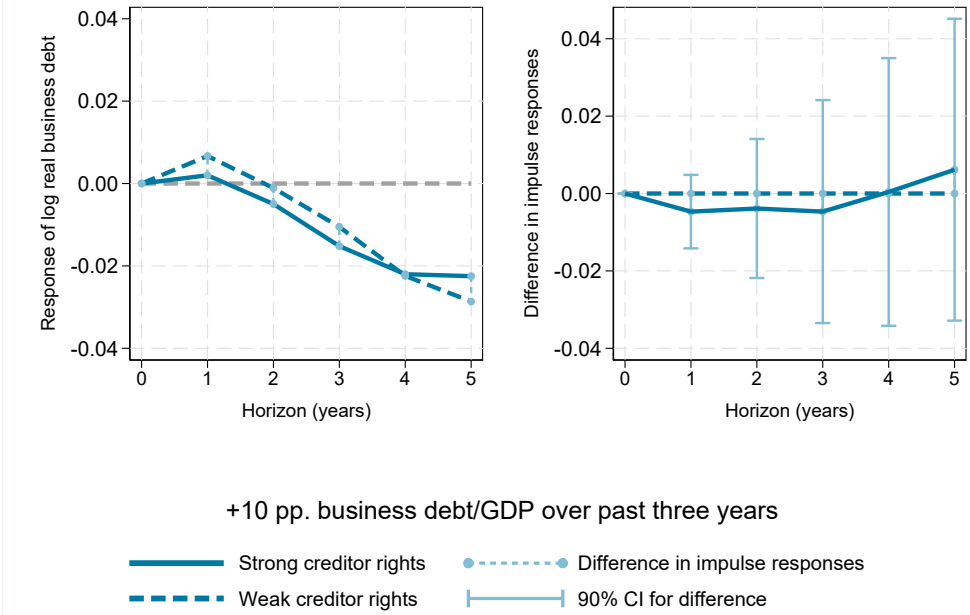


(b) Credit Spreads



Notes: These figures visualize estimates from the local projections following equation (4) with two alternative dependent variables. Panel (a) plots the impulse response of the share of newly issued firm debt with a high yield rating (Kirti, 2025). Panel (b) plots the impulse 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 left 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 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.

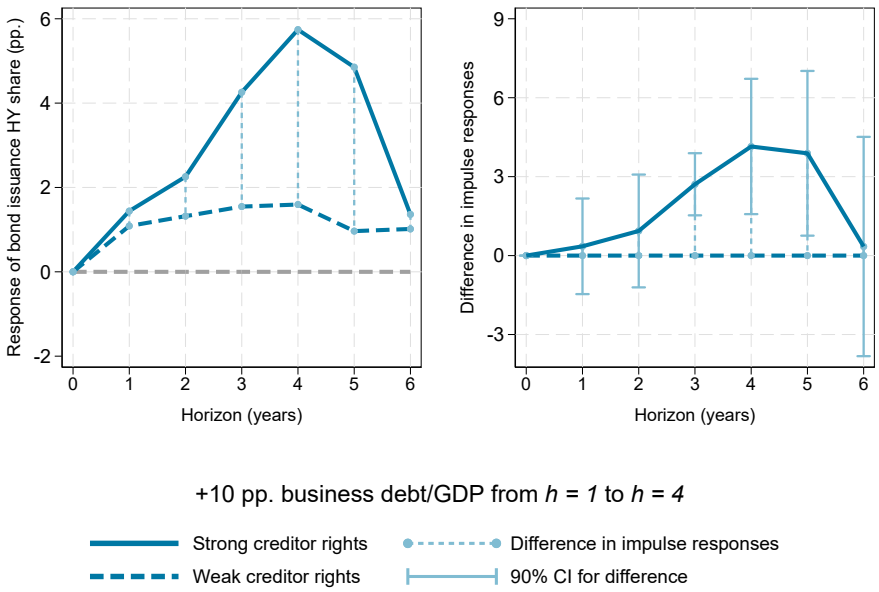
Figure B.12: Creditor Rights and Aggregate Business Credit



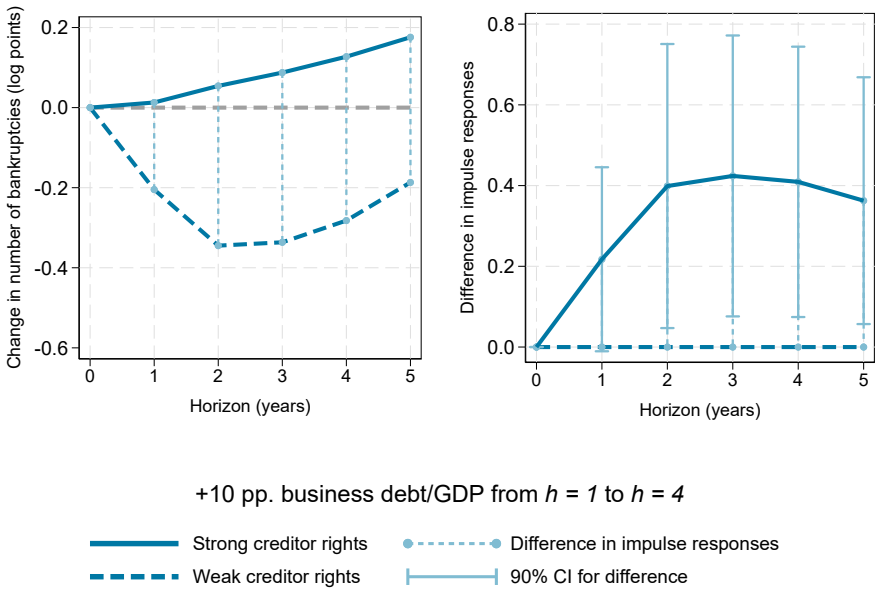
Notes: This figure shows impulse response estimates from local projections following a 10 percentage point increase in the business debt-to-GDP ratio over three years. The figure shows predicted cumulative changes in log real business debt. Each local projection controls for the contemporaneous value as well as five lags of the dependent variable, real GDP growth and changes in the household debt-to-GDP ratio. The left 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 right graph plots the difference between those impulse responses, with corresponding 90% confidence intervals based on Driscoll-Kraay standard errors.

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

(a) Risky Firms Debt Share



(b) Bankruptcy Filings



Notes: These figures visualize estimates from local projections as in equation (8) 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.