Overview

Credit cycles: leading topic in discussions about macroeconomic stability

- Growing evidence: credit booms create real damage
  
  [Schularick and Taylor (2012); Mian, Sufi, and Verner (2017); Greenwood et al. (2022); Ivashina et al. (2024)]

This paper: real damage following credit booms vary with bankruptcy institutions

- Credit booms ⇒ high debt burden, rising defaults ⇒ real damage
- Business bankruptcy institutions matter for resolution of default & its real damage

Legal institutions relevant for macroeconomic stability
Overview

**Data:** bankruptcy efficiency, business credit, & macro outcomes across 39 countries

- **Djankov et al. (2008):** measure % value preserved for a viable firm in bankruptcy
- Some countries liquidate inefficiently & incur high costs; other restructure efficiently

Empirical findings:
- Low bankruptcy efficiency: business credit booms followed by long & severe contractions
- High bankruptcy efficiency: business credit booms followed by modest output changes

Model:
- How bankruptcy efficiency mitigates negative consequences of credit booms
- By avoiding inefficient liquidations
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**Model:** how bankruptcy efficiency mitigates negative consequences of credit booms
- By avoiding inefficient liquidations
Road Map

1. Essence of Business Bankruptcy
2. Data
3. Empirical Evidence
4. Model
5. Summary
Why Bankruptcy Institutions Relevant

#1 Economic outcomes depend on quality of default resolution

Default resolution:

1. Traditional approach: terminate operations, **liquidate** assets
   - Inefficient liquidation of viable companies induces substantial losses
     - [Ramey and Shapiro (2001); Corbae and D’Erasmo (2021); Crouzet et al. (2022); Kermani and Ma (2023)]
   - Reduce output directly + generate negative macroeconomic spillovers

2. Modern approach: **restructure** viable firms if continuation value > liquidation value
   - Keep viable firms alive
   - Avoid output loss & its negative macroeconomic spillovers

#2 Quality of default resolution depends on bankruptcy institutions
Why Bankruptcy Institutions Relevant

#1 Economic outcomes depend on quality of default resolution

#2 Quality of default resolution depends on bankruptcy institutions

Bankruptcy: legal process to facilitate default resolution
  • Ideally: restructure viable firms, liquidate unviable firms

Functions of bankruptcy institutions (laws & courts):
  • Alleviate information frictions: collect and verify info about the debtor
  • Alleviate coordination frictions: prevent creditors’ unilateral actions disrupting resolution
  • Can be especially important for restructuring
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Data

Combined sample: 39 countries from 2003 to 2019
- Business credit data restrict # of countries, bankruptcy efficiency data start in 2003

Business credit: Bank of International Settlements (loans + bonds)

GDP, investment, unemployment, consumption: World Bank

Bankruptcy efficiency: Djankov et al. (2008), extended by World Bank (2020)
- Example of viable firm in financial distress: continuation value 100, liquidation value 70
- Ask legal professionals in 100+ countries every year about the most likely scenario
  ▶ E.g., outcome, value preserved, duration, and expenses

Bankruptcy efficiency: % of continuation value preserved (net of expenses)
  ▶ Positively correlated with recovery rate imputed from impairment/non-performing loans (BIS)
Large Variation in Bankruptcy Efficiency around the World

Example Year: 2015
Road Map

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Macro Dynamics following Business Credit Booms
Outcome after change in credit/GDP, à la Mian, Sufi, and Verner (2017)

Local projections for annual horizons $h = 1, \ldots, 5$, with country $i$ & year $t$:

$$\Delta_h Y_{i,t+h} = \alpha_{i,h} + \beta_{1,h} \Delta_5 c_{i,t} + \beta_{2,h} (\Delta_5 c_{i,t} \times B_{i,t}) + \beta_{3,h} B_{i,t} + \gamma_h x_{i,t} + \epsilon_{i,t}$$

- $\Delta_h Y_{i,t+h}$: change in log real GDP, investment, consumption in the next $h$ years
- $\Delta_5 c_{i,t}$: change in business credit to GDP in the past 5 years
- $B_{i,t}$: bankruptcy efficiency

Findings:
- $\beta_{1,h} < 0$: GDP, investment, & consumption significantly lower following credit booms
- $\beta_{2,h} > 0$: less so when bankruptcy efficiency is high
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- $x_{i,t}$: 5 lags of real GDP growth & changes in household credit to GDP in the past 5 years
- $\alpha_{i,h}$: horizon-specific country fixed effects

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GDP following Business Credit Booms

Impulse response for bottom/top quartile of bankruptcy efficiency (w/ Driscoll-Kraay SEs)

-4 -3 -2 -1 0 1
Impulse response of real GDP (pp.)

-4 -3 -2 -1 0 1
Years since boom

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Investment following Business Credit Booms

Impulse response for bottom/top quartile of bankruptcy efficiency (w/ Driscoll-Kraay SEs)

- Low bankruptcy efficiency

- High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Consumption following Business Credit Booms

Impulse response for bottom/top quartile of bankruptcy efficiency (w/ Driscoll-Kraay SEs)

-4 -3 -2 -1 0 1 2 3 4 5
Years since boom

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Other Outcomes

- **Unemployment**: increases significantly in low bankruptcy efficiency countries
- **TFP**: decreases significantly in low bankruptcy efficiency countries
- **Asset prices**: decrease significantly in low bankruptcy efficiency countries
- **Recovery**: gradually over 10 years in low bankruptcy efficiency countries

**Recession probability & severity:**
- Recession *probability* increases following credit booms in low bankruptcy efficiency countries
- Recessions are *deeper & longer* in low efficiency countries [Jordà et al. (2022)]
Robustness Checks

- Concern: bankruptcy efficiency correlated with other factors that stabilize the economy
  - Control for development status, exchange rate regime, general rule of law, GDP volatility, cyclicality of monetary, fiscal, and macropru policy, & interacted with business credit booms

Concern: recession may lower bankruptcy efficiency (e.g., court congestion)

- Use bankruptcy efficiency at the beginning of sample
- Instrument bankruptcy efficiency with legal origins
- Explain about 30% of the variations in bankruptcy efficiency

Alternative windows for measuring business credit booms

Check results are symmetric for business credit booms and contraction
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A Simple Theoretical Framework

**Model:** how & when bankruptcy efficiency mitigates negative consequences of credit booms

**Ingredients:**
- Firms finance risky investments with defaultable debt & optimally choose leverage
- Following default, firms either liquidate (inefficient, output losses) or reorganize (efficient)
- Model the efficiency of bankruptcy institutions as the likelihood of inefficient liquidation
Model Predictions

**Predictions** for nonfundamental booms (driven by discount rates or biased beliefs):

- Credit booms are followed by lower output and more defaults
  - Higher leverage $\implies$ more defaults $\implies$ more inefficient liquidation & output losses
- More efficient bankruptcy mitigates the negative consequences of these credit booms
  - More efficient bankruptcy decreases the likelihood of inefficient liquidation
  - Despite more efficient bankruptcy increases the size of credit market & leverage
- Consistent with data

Inconsistent with data and the literature
- [Schularick and Taylor (2012); Mian, Sufi, and Verner (2017); Greenwood et al. (2022); Ivashina et al. (2024)]
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- Consistent with data

Predictions for fundamental booms (driven by increases in firms’ productivity) are reversed:

- Boom followed by higher output and fewer defaults (because of increases in productivity)
- Inconsistent with data and the literature
  [Schularick and Taylor (2012); Mian, Sufi, and Verner (2017); Greenwood et al. (2022); Ivashina et al. (2024)]
Summary
Credit booms detrimental when business bankruptcy functions poorly

Law and macro: legal institutions can matter for macroeconomic stability
- Has motivated bankruptcy reforms (e.g., Japan in 1990s)
- Can be even more important when the economy relies more on intangible capital

Macroprudential policies:
- Common view: use macroprudential policies to restrain credit booms to prevent crisis
- But macroprudential policies also have costs (e.g., regulatory burdens, misallocation)
- Net benefits higher when credit booms are likely to create real damage
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Understanding default resolution in practice can be useful for macroeconomic analyses

- Ongoing: quantitative model to analyze macro implications of corporate debt contracts


## GDP following Business Credit Booms

<table>
<thead>
<tr>
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<th>(1) $h = 1$</th>
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<tbody>
<tr>
<td>$\Delta_5$ Business credit/GDP $\times$ Bankruptcy efficiency</td>
<td>0.143*** (0.048)</td>
<td>0.319*** (0.080)</td>
<td>0.546*** (0.114)</td>
<td>0.633*** (0.134)</td>
<td>0.669*** (0.172)</td>
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<td>$\Delta_5$ Business credit/GDP</td>
<td>-0.146*** (0.046)</td>
<td>-0.310*** (0.072)</td>
<td>-0.490*** (0.103)</td>
<td>-0.555*** (0.119)</td>
<td>-0.576*** (0.145)</td>
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<td>Bankruptcy efficiency</td>
<td>-0.939 (0.954)</td>
<td>-1.385 (1.185)</td>
<td>-0.700 (1.965)</td>
<td>-0.260 (2.887)</td>
<td>-0.082 (3.293)</td>
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<td>$R^2$</td>
<td>0.42</td>
<td>0.52</td>
<td>0.60</td>
<td>0.66</td>
<td>0.71</td>
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<td>Observations</td>
<td>560</td>
<td>522</td>
<td>484</td>
<td>446</td>
<td>408</td>
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</table>
GDP following Business Credit Booms: Longer Term

Longer term reduces # of obs (due to sample period)

- Impulse response of real GDP (pp.)
- Years since boom

Low efficiency bankruptcy

High efficiency bankruptcy

+10 pp. business credit/GDP over past five years
Business Credit Boom over Past 3 Years

Impulse response of real GDP (pp.)

Low bankruptcy efficiency

Years since boom

High bankruptcy efficiency

+6 pp. business credit/GDP over past three years
Business Credit Boom over Past 8 Years

Low bankruptcy efficiency

High bankruptcy efficiency

+16 pp. business credit/GDP over past eight years
Symmetry between Credit Booms and Contractions

-10 pp. business credit/GDP over past five years
Unemployment Rate following Business Credit Booms

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
TFP following Business Credit Booms

Impulse response of TFP (pp.)

Years since boom

Low efficiency bankruptcy

High efficiency bankruptcy

+10 pp. business credit/GDP over past five years
Stock Prices following Business Credit Booms

Stock price data available for 36 countries

- Low bankruptcy efficiency
  - Impulse response of equity index (pp.)
  - Years since boom

- High bankruptcy efficiency
  - Impulse response of equity index (pp.)
  - Years since boom

+10 pp. business credit/GDP over past five years
Credit Spreads following Business Credit Booms

Credit spread data available for 20 countries

-0.50 -0.25 0.00 0.25 0.50 0.75
Impulse response of corp. credit spreads (pp.)
0 1 2 3 4 5
Years since boom

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Recession Risk following Business Credit Booms

Recession defined as negative GDP growth

![Graph showing cumulative recession probability over years since boom for low and high efficiency bankruptcies. The graphs illustrate that the probability of recession increases with time after a credit boom, with higher efficiency bankruptcies having a higher cumulative probability. The red line indicates an increase of +10 pp. business credit/GDP over the past five years.](image-url)
Crisis Risk following Business Credit Booms

**Low efficiency bankruptcy**

- Average cumulative probability
- +10 pp. business credit/GDP over past five years

**High efficiency bankruptcy**
Control for Development Status

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Control for Development Status

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<tr>
<td>$\Delta_5$ Business credit/GDP $\times$ Bankruptcy efficiency</td>
<td>0.176**</td>
<td>0.347***</td>
<td>0.487***</td>
<td>0.425**</td>
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<td>(0.075)</td>
<td>(0.116)</td>
<td>(0.154)</td>
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<td>$\Delta_5$ Business credit/GDP</td>
<td>-0.173**</td>
<td>-0.331***</td>
<td>-0.441***</td>
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<td>(0.060)</td>
<td>(0.095)</td>
<td>(0.128)</td>
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<td>Bankruptcy efficiency</td>
<td>-0.869</td>
<td>-0.863</td>
<td>0.743</td>
<td>2.989**</td>
<td>4.708*</td>
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<td>(0.907)</td>
<td>(1.206)</td>
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<td>(1.103)</td>
<td>(2.240)</td>
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<td>$\Delta_5$ Business credit/GDP $\times$ Emerging market economy</td>
<td>0.058</td>
<td>0.105</td>
<td>0.064</td>
<td>-0.028</td>
<td>-0.123***</td>
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<td>Emerging market economy</td>
<td>2.043*</td>
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Control for Exchange Rate Regime

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
## Control for Exchange Rate Regime

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<td>0.175**</td>
<td>0.427***</td>
<td>0.688***</td>
<td>0.763***</td>
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<td>(0.063)</td>
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<td>$\Delta_5 \text{ Business credit/GDP}$</td>
<td>-0.156***</td>
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<td>(0.049)</td>
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<td>Bankruptcy efficiency</td>
<td>-1.514*</td>
<td>-2.748**</td>
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<td>(0.841)</td>
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<td>$\Delta_5 \text{ Business credit/GDP} \times \text{ Currency peg}$</td>
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<td>-0.118**</td>
<td>-0.111*</td>
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<td>Currency peg</td>
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<td>5.528**</td>
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Control for General Rule of Law

Impulse response of real GDP (pp.) vs. Years since boom for Low and High bankruptcy efficiency.

- Low bankruptcy efficiency: GDP decreases significantly over the first two years since the boom.
- High bankruptcy efficiency: GDP decreases more gradually but still shows a significant decline over the same period.

Red line indicates a +10 pp. business credit/GDP over the past five years.
## Control for General Rule of Law

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<td>( \Delta_5 ) Business credit/GDP ( \times ) Bankruptcy efficiency</td>
<td>0.065</td>
<td>0.208**</td>
<td>0.391***</td>
<td>0.435**</td>
<td>0.367*</td>
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<td>(0.088)</td>
<td>(0.122)</td>
<td>(0.143)</td>
<td>(0.196)</td>
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<td>( \Delta_5 ) Business credit/GDP</td>
<td>-0.105**</td>
<td>-0.253***</td>
<td>-0.411***</td>
<td>-0.455***</td>
<td>-0.424**</td>
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<td>(0.041)</td>
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<td>(0.115)</td>
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<td>Bankruptcy efficiency</td>
<td>-0.235</td>
<td>-0.203</td>
<td>1.610</td>
<td>3.621</td>
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<td>(0.957)</td>
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<td>( \Delta_5 ) Business credit/GDP ( \times ) Rule of law</td>
<td>0.037*</td>
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<td>0.105**</td>
<td>0.160***</td>
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<td>-7.579*</td>
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<td></td>
<td>(0.872)</td>
<td>(1.120)</td>
<td>(1.423)</td>
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<td>522</td>
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GDP following Business Credit Booms with Fixed Bankruptcy Efficiency

Impulse response of real GDP (pp.)

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Instrumenting with Legal Origin

**Low bankruptcy efficiency**

**High bankruptcy efficiency**

[Graph showing impulse response of real GDP (pp.) over years since boom for low and high bankruptcy efficiency, indicating +10 pp. business credit/GDP over past five years.]
## Instrumenting with Legal Origin

<table>
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<tr>
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<th>(4) $h = 4$</th>
<th>(5) $h = 5$</th>
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<tr>
<td>$\Delta_5$ Business credit/GDP $\times$ Bankruptcy efficiency (instr.)</td>
<td>0.212** (0.095)</td>
<td>0.528*** (0.157)</td>
<td>0.734*** (0.185)</td>
<td>0.712*** (0.209)</td>
<td>0.572*** (0.191)</td>
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<td>$\Delta_5$ Business credit/GDP</td>
<td>-0.195** (0.077)</td>
<td>-0.458*** (0.122)</td>
<td>-0.624*** (0.144)</td>
<td>-0.611*** (0.171)</td>
<td>-0.506*** (0.164)</td>
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<td>First stage $F$</td>
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<td>17.94</td>
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Instrumenting with Legal Origin
Also Controlling for General Rule of Law

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Instrumenting with Legal Origin
Also Controlling for General Rule of Law

<table>
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<tbody>
<tr>
<td>( \Delta_5 ) Business credit/GDP ( \times ) Bankruptcy efficiency (instr.)</td>
<td>0.260* (0.143)</td>
<td>0.595*** (0.219)</td>
<td>0.730*** (0.208)</td>
<td>0.629*** (0.216)</td>
<td>0.321* (0.165)</td>
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<td>( \Delta_5 ) Business credit/GDP</td>
<td>-0.225** (0.095)</td>
<td>-0.473*** (0.139)</td>
<td>-0.634*** (0.150)</td>
<td>-0.638*** (0.163)</td>
<td>-0.552*** (0.148)</td>
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<td>( \Delta_5 ) Business credit/GDP ( \times ) Rule of Law</td>
<td>-0.305 (2.283)</td>
<td>-2.482 (3.346)</td>
<td>1.084 (4.024)</td>
<td>6.694* (3.855)</td>
<td>16.954*** (2.929)</td>
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<td>Rule of law index</td>
<td>0.012 (1.036)</td>
<td>-0.120 (1.446)</td>
<td>-1.610 (1.542)</td>
<td>-3.840* (2.166)</td>
<td>-7.638* (4.187)</td>
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<td>First stage ( F )</td>
<td>8.14</td>
<td>10.35</td>
<td>9.81</td>
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<td>0.13</td>
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Bankruptcy Efficiency and Level of Business Credit/GDP
Control for Debt Level

Impulse response of real GDP (pp.)

Low bankruptcy efficiency

High bankruptcy efficiency

+10 pp. business credit/GDP over past five years
Efficiency of Reorganization vs Liquidation

Data from Djankov et al. (2008)

Notes: X-axis measures reorganization efficiency, i.e., share of a viable firm’s value preserved in bankruptcy. Y-axis measures the efficiency of liquidation, i.e., share of liquidation value of a nonviable firm preserved in bankruptcy.
Controlling for GDP per Capita

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<tr>
<td>( \Delta_5 ) Business credit/GDP ( \times ) Bankruptcy efficiency</td>
<td>0.150***</td>
<td>0.316***</td>
<td>0.486***</td>
<td>0.577***</td>
<td>0.572***</td>
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<td>(0.041)</td>
<td>(0.061)</td>
<td>(0.082)</td>
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<td>( \Delta_5 ) Business credit/GDP</td>
<td>0.053</td>
<td>0.085</td>
<td>-0.143</td>
<td>0.227</td>
<td>0.376</td>
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<td></td>
<td>(0.202)</td>
<td>(0.509)</td>
<td>(0.730)</td>
<td>(0.886)</td>
<td>(0.939)</td>
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<td>Bankruptcy efficiency</td>
<td>3.889**</td>
<td>8.188***</td>
<td>14.175***</td>
<td>19.141***</td>
<td>24.054***</td>
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<td>(1.326)</td>
<td>(2.016)</td>
<td>(2.886)</td>
<td>(3.725)</td>
<td>(3.401)</td>
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<td>( \Delta_5 ) Business credit/GDP ( \times ) Log real GDP p.c.</td>
<td>-0.018</td>
<td>-0.034</td>
<td>-0.023</td>
<td>-0.062</td>
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<td>(0.049)</td>
<td>(0.070)</td>
<td>(0.082)</td>
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<td>(1.876)</td>
<td>(4.997)</td>
<td>(7.217)</td>
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<td>( R^2 )</td>
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<td>0.55</td>
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<td>0.76</td>
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Controlling for Monetary Policy Stabilization

<table>
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<td>$\Delta_5$ Business credit/GDP $\times$ Bankruptcy efficiency</td>
<td>-0.013</td>
<td>0.120</td>
<td>0.353$^*$</td>
<td>0.418$^{**}$</td>
<td>0.490$^{**}$</td>
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<td></td>
<td>(0.072)</td>
<td>(0.155)</td>
<td>(0.172)</td>
<td>(0.160)</td>
<td>(0.188)</td>
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<td>$\Delta_5$ Business credit/GDP</td>
<td>-0.078$^*$</td>
<td>-0.226$^{**}$</td>
<td>-0.419$^{***}$</td>
<td>-0.478$^{***}$</td>
<td>-0.523$^{***}$</td>
</tr>
<tr>
<td></td>
<td>(0.039)</td>
<td>(0.077)</td>
<td>(0.081)</td>
<td>(0.088)</td>
<td>(0.127)</td>
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<td>Bankruptcy efficiency</td>
<td>-4.551$^{***}$</td>
<td>-8.525$^{***}$</td>
<td>-11.098$^{***}$</td>
<td>-12.121$^{***}$</td>
<td>-12.458$^{***}$</td>
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<td>(0.944)</td>
<td>(2.516)</td>
<td>(3.269)</td>
<td>(2.558)</td>
<td>(2.028)</td>
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<td>$\Delta_5$ Business credit/GDP $\times$ Monetary cyclicality</td>
<td>0.002$^{***}$</td>
<td>0.003$^{**}$</td>
<td>0.003$^*$</td>
<td>0.004$^{**}$</td>
<td>0.003$^*$</td>
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<td>323</td>
<td>297</td>
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Notes: Monetary cyclicality in a country $i$ measured by $\beta_i$ from $\Delta \text{policy rate}_{i,t} = \alpha_i + \beta_i \Delta \log \text{real GDP}_{i,t} + e_{i,t}$. 
### Controlling for Fiscal Policy Stabilization

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<tbody>
<tr>
<td>$\Delta_5 \text{ Business credit/GDP} \times \text{Bankruptcy efficiency}$</td>
<td>0.132*** (0.043)</td>
<td>0.294*** (0.066)</td>
<td>0.503*** (0.095)</td>
<td>0.589*** (0.121)</td>
<td>0.618*** (0.160)</td>
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<tr>
<td>$\Delta_5 \text{ Business credit/GDP}$</td>
<td>-0.145*** (0.047)</td>
<td>-0.315*** (0.070)</td>
<td>-0.497*** (0.098)</td>
<td>-0.566*** (0.113)</td>
<td>-0.587*** (0.139)</td>
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<td>Bankruptcy efficiency</td>
<td>-0.617 (0.986)</td>
<td>-0.523 (1.318)</td>
<td>0.597 (2.128)</td>
<td>1.272 (2.862)</td>
<td>1.498 (2.970)</td>
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<td>$\Delta_5 \text{ Business credit/GDP} \times \text{Fiscal cyclicality}$</td>
<td>-0.013 (0.016)</td>
<td>-0.058* (0.022)</td>
<td>-0.100*** (0.033)</td>
<td>-0.123*** (0.028)</td>
<td>-0.143*** (0.020)</td>
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<td>$R^2$</td>
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Notes: Fiscal cyclicality in a country $i$ measured by $\beta_i$ from $\Delta(\text{Gov. expenditure/GDP})_{i,t} = \alpha_i + \beta_i \Delta \log \text{real GDP}_{i,t} + e_{i,t}$. 


Controlling for GDP Volatility

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<tr>
<td>$\Delta_5$ Business credit/GDP $\times$ Bankruptcy efficiency</td>
<td>0.120*</td>
<td>0.307**</td>
<td>0.515***</td>
<td>0.538**</td>
<td>0.461*</td>
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<td></td>
<td>(0.056)</td>
<td>(0.122)</td>
<td>(0.164)</td>
<td>(0.183)</td>
<td>(0.224)</td>
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<td>$\Delta_5$ Business credit/GDP</td>
<td>-0.096</td>
<td>-0.267</td>
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<td>-0.347</td>
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<td>Bankruptcy efficiency</td>
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</table>

Notes: GDP volatility measured as the standard deviation of annual growth in real GDP.
Validating World Bank Bankruptcy Efficiency Measure

Notes: Binned scatter plot of survey-based measures of bankruptcy efficiency and loan recovery rates proxied by $1 - \frac{\text{loan impairments}}{\text{non-performing loans}}$. Impairments and non-performing loans are from the BIS Credit Loss Database. Data from 153 countries from 2003 to 2019, net of year fixed effects.