

Zombies at Large?

Corporate Debt Overhang and the Macroeconomy

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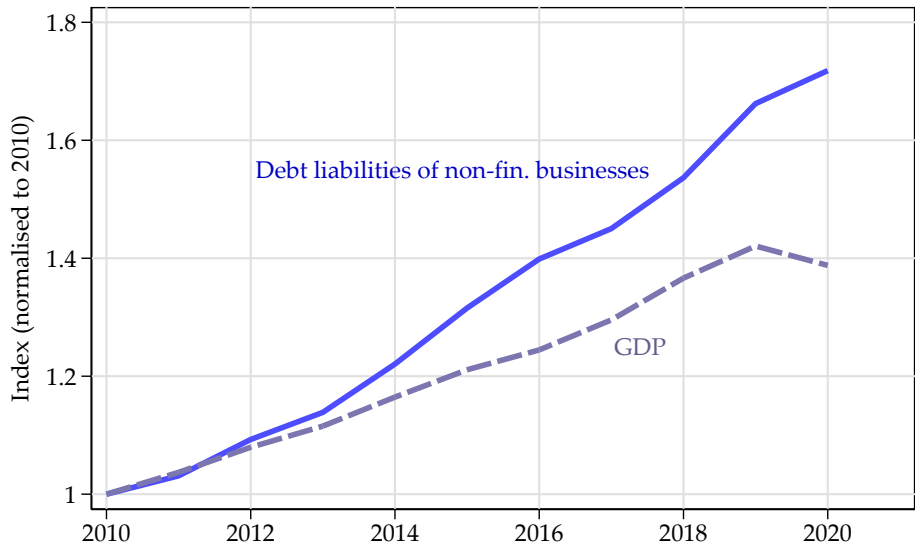
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United States



Motivation

- The pandemic **recession** hit after decade-long **business credit boom**.
- Do we need to dial down expectations for the recovery and future growth?
 - cf. household debt and GFC (*Mian, Suñi, 2010; Jordà et al, 2013*)
 - Will **corporate debt overhang** restrain aggregate investment?
 - Will exposed **banks evergreen loans** to unprofitable "zombie" firms?

Corporate debt overhang

- Default risk undermines incentives to invest efficiently (*Myers, 1977*).
 - In states of default, investment proceeds accrue to creditors (not firm owners)
 - Anticipating sub-optimal investment, creditors limit funding to indebted firms
 - Distortions grow with default risk

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 - Anticipating sub-optimal investment, creditors limit funding to indebted firms
 - Distortions grow with default risk
- ⇒ Recessions should be worse after business credit booms:
 - leverage coupled with higher profit risk spurs default risk
 - poor aggregate investment translates into poor GDP growth

Zombie lending

- High default risk can lead to inefficient lending (*Peek, Rosengreen, 2005*)
 - Banks have incentives to conceal asset risks (regulation, funding conditions)
 - Can be worthwhile to keep insolvent borrowers afloat (temporarily)
- Zombie lending threaten business dynamism and productivity growth (*Caballero, Hoshi, Kashyap, 2008*)

Zombie lending

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⇒ Recessions should be worse after business credit booms:

- recessions weaken banks
- bank exposure grows in aggregate business debt
- leverage coupled with higher profit risk spurs default risk

Mixed empirical evidence

Firm-level data

- Corporate debt overhang confirmed repeatedly in US data (*Lang, Ofek, Stulz, 1996; Hennessey, 2004; Albuquerque, 2021*) but mixed evidence in European data (*Popov, Barbiero, Wolski, 2018; Kalemlı-Özcan, Laeven, Moreno, 2020*)
- Zombie lending (and adverse consequences) documented for Japan and Europe (*Peek, Rosengreen, 2005; Caballero, Hoshi, Kashyap, 2008; Adalet McGowan, Andrews, Millot, 2017; Banerjee, Hofmann, 2018; Acharya, Crosignani, Eisert, Eufinger, 2020*)

Country-level data

- Business credit does *not* predict downturns in OECD panel (*Mian, Sufi, Verner, 2017*)

What we do

- Revisit the macro effects of corporate debt:
 - Use new **historical data** on total business credit
 - Increase test sensitivity: condition on **recessions**
- Study **heterogeneity** across bankruptcy regimes

The moderating role of bankruptcy institutions

- Debt renegotiation can in principle fully resolve debt overhang (*Fama, 1978; Bergman, Callen, 1988*)
- Zombies thrive on weak creditor rights & protracted legal procedures (*Adalet McGowan, Andrews, Millot, 2017; Andrews, Petroulakis, 2019*)
- Large heterogeneity in bankruptcy institutions across countries and time (*Wood, 1995; Adalet McGowan, Andrews, Millot, 2018*)

What we find

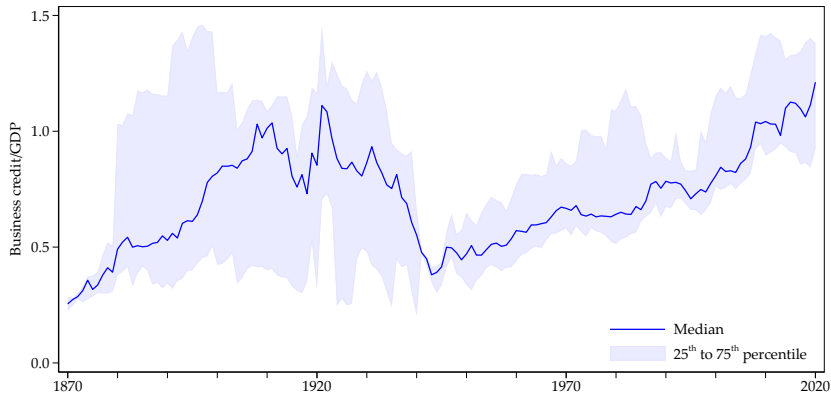
- Business credit booms do *not* predict worse recession trajectories
- **Costs of business debt booms visible under weak bankruptcy regimes**

Data

- Long-run annual data for total business sector **debt liabilities**
 - Bank loans, bonds and lending from non-bank intermediaries
 - Total of 18 countries, pre-WW2 series for 9 countries (480 pre-WW2 data points)
- Other **macrofinancial data** from JST database (www.macroeconomy.net/data)
- Business cycles dated by Bry and Boschan (1971) algorithm
- Index of **bankruptcy frictions** based on *Djankov, McLiesh, Shleifer (2007)* and *Djankov, Hart, McLiesh, Shleifer (2008)*

Panorama of historical business credit data

Business credit/GDP since 1870



Notes: The figure shows non-financial business credit over GDP for our sample of 18 advanced economies. Interquartile range around median shaded.

Notation

$it(p)$ Sample of country-years at business cycle peak

$\Delta_h y_{it(p)+h}$ h -year change of log real GDP pc. (cumulative)

$\Delta_5 x_{it(p)}^B$ five-year change in business credit/GDP

$\Delta_5 x_{it(p)}^H$ five-year change in household credit/GDP

$w_{it(p)}$ Dynamic macro controls [► Details](#)

Local projections

$$\Delta_h y_{it(p)+h} = \alpha_h + \alpha_{hi} + \beta_h^B \Delta_5 x_{it(p)}^B + \beta_h^H \Delta_5 x_{it(p)}^H + \gamma_h \mathbf{w}_{it(p)} + \epsilon_{it(p)}, \quad h = 1, \dots, 5$$

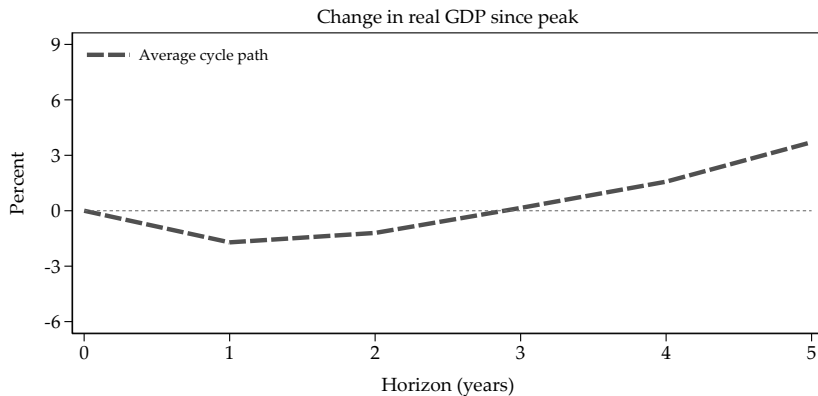
α_h Average recession path (demeaned regressors)

α_{hi} Country fixed effects, summing to zero

$\alpha_h + \beta_h^j \Delta_5 x_{it(p)}^j$ Recession/recovery path for given $\Delta_5 x_{it(p)}^j, j = B, H$

Predicting recession trajectories

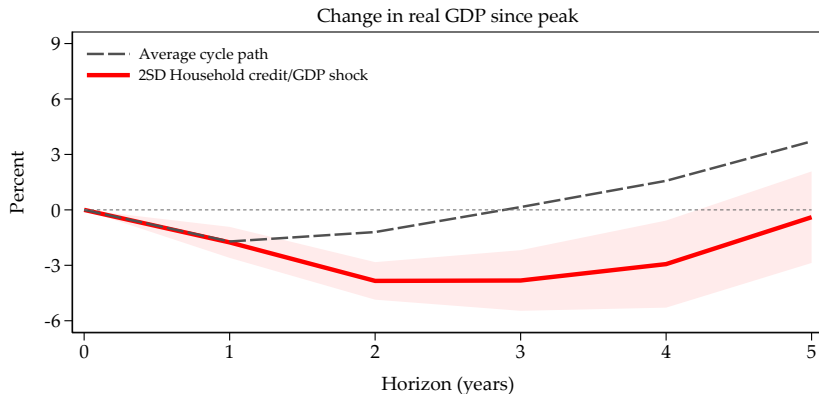
Average



Notes: Average recession trajectory following a business cycle peak at $t = 0$.

Predicting recession trajectories

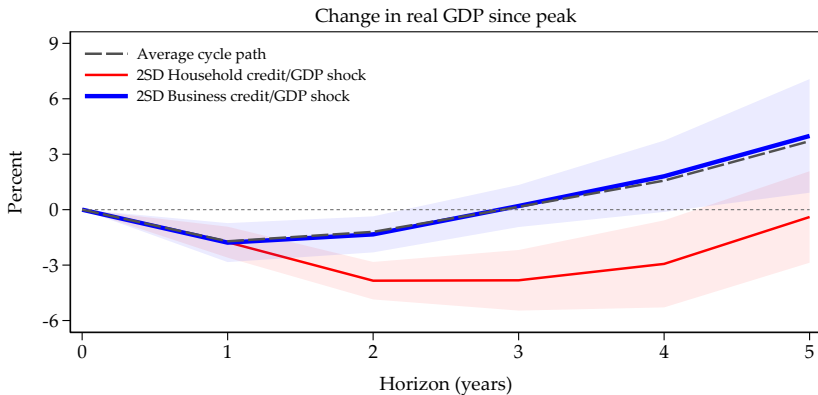
Household credit booms



Notes: Predictive effects on growth of a two-SD credit expansion in the five years preceding the recession for household credit booms. Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

Predicting recession trajectories

Business credit booms



Notes: Predictive effects on growth of a two-SD credit expansion in the five years preceding the recession for business credit booms and household credit booms. Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

Robustness

- ▶ "Financial" vs. "normal" recession
- ▶ Quantile Local Projections: Tail risks?
- ▶ Interacting with levels of credit/GDP
- ▶ Driscoll-Kraay standard errors
- Effects on ▶ Consumption ▶ Investment ▶ Unemployment ▶ Inflation ▶ Business credit ▶ Household credit
- Misc: Including time trends; restricting sample to post 1950; excluding the Global Financial Crisis; using real credit growth (instead of changes in credit/GDP)

- Corporate debt burdens not associated with worse recessions in modern history of advanced economies.
- Time to pack up and never worry about business credit again?
- Second thoughts about household vs. business credit: **Role of legal factors?**

Differences in legal institutions

- Debt to households
 - natural person; debt to smooth consumption
 - debt exemptions; tend to be flimsy (e.g. *Niemi-Kiesiläinen, 1997; Mitman, 2016*)
- Debt to businesses
 - abstract legal entity; debt for sake of profits
 - well-developed system of laws to resolve business insolvency (*Brouwer, 2006*)
 - Possible underinvestment incentivises renegotiation (*Bergman, Callen, 1991*)

Bankruptcy frictions

Can bankruptcy frictions squander the legal advantage of business debt?

- Frictions to **renegotiation** unleash *debt overhang*
- Frictions to **renegotiation** or **liquidations** foster *zombie lending*

Measuring bankruptcy frictions

1978–2002 Djankov, McLiesh and Shleifer (2007): Index of *creditor rights*

- Strong creditor rights...
- ... reduce liquidation costs.
- ... induce owners to renegotiate.

2003–2019 World Bank, based on Djankov, Hart, McLiesh and Shleifer (2008)

- High "Recovery rate" ...
- ... indicates low-cost liquidation.
- ... indicates swifter restructuring.

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$$\Rightarrow \text{Legal friction indicator } L_{it} = \begin{cases} 1 & \text{"High friction" (index below median)} \\ 0 & \text{"Low friction" (index above median)} \end{cases}$$

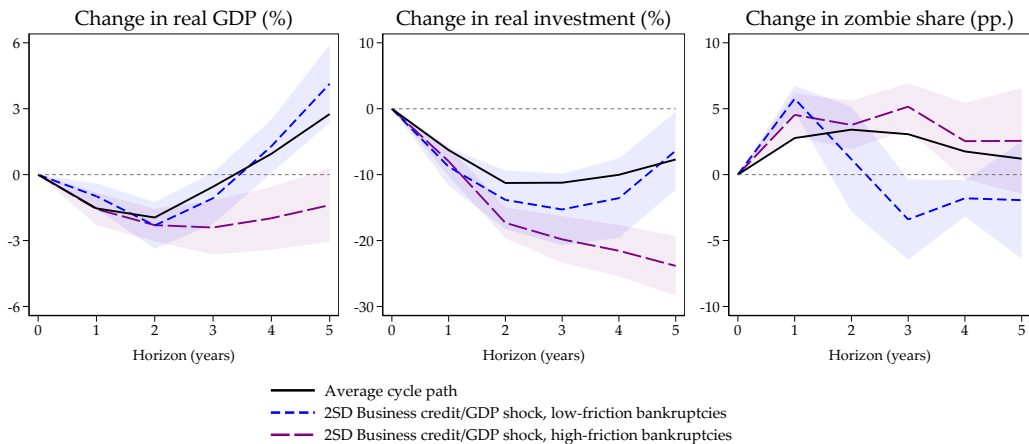
Augment Local Projections

Interaction of friction indicator with business credit:

$$\Delta_h y_{it(p)+h} = \alpha_h + \alpha_{hi} + \beta_h^H \Delta_5 x_{it(p)}^H + \beta_h^B \Delta_5 x_{it(p)}^B + \beta_h^{BL} \Delta_5 x_{it}^B \times L_{it} + \gamma_h w_{it(p)} + e_{it(p)}$$

- $L_{it} \in \{0, 1\}$ indicator for bankruptcy frictions to restructuring or liquidation.
- Dependent variables: GDP, investment, zombie share (from *Banerjee, Hofman, 2018*)
- Otherwise same setup as before.

Recessions and reorganization frictions



Notes: Predictive effects on GDP, investment and the share of zombies among listed firms of a two-SD quinquennial business credit build-up preceding the recession in low (high) friction bankruptcy regimes. Including standard controls and country fixed effects. Shaded areas denote the 90% confidence interval based on standard errors clustered on countries.

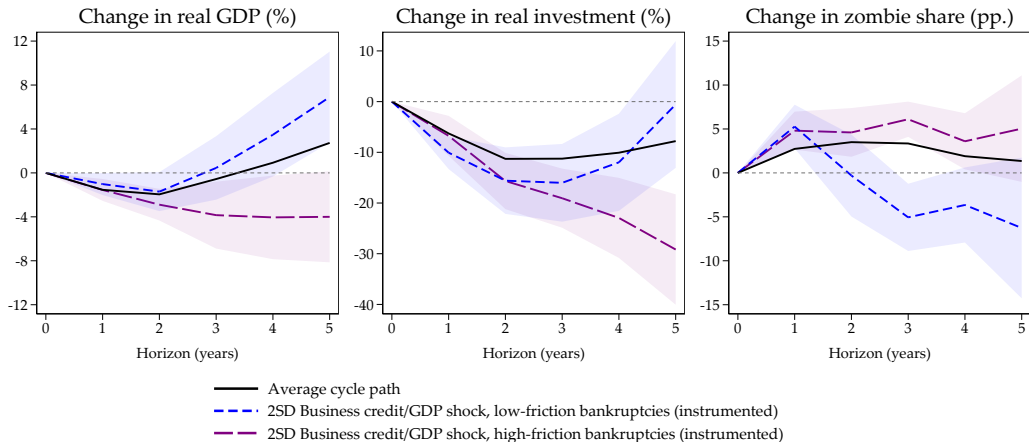
Do we identify the effect of bankruptcy regimes?

- "Static" confounders which themselves interact with credit booms:
 - Creditor rights have been linked to financial market development: Merely proxying well-functioning secondary markets for non-performing loans?
▶ Controlling for credit market size
 - Bankruptcy frictions might correlate with poor financial regulation. Well-governed financial systems presumably more resilient and capable to deal with wide-spread business defaults ▶ Controlling for banking supervision quality
- "Dynamic" confounders of *interaction* between bankruptcy and credit
 - E.g., reforms coinciding with business credit booms, which simultaneously improve i) recession resilience and ii) bankruptcy.

Circumventing dynamic confounders

- Legal origins exogenous to today's business cycle shocks
- Civil law vs. common law traditions
- Key difference for us: Interlocutory appeals to courts frequent in civil law bankruptcy proceedings, impeding restructuring and liquidation.
- **Instrument:** Civil law origin $z_i \in \{0, 1\}$.
- Strong and significant negative link to bankruptcy efficiency ($F > 10$)

Legal origin IV



Notes: Predictive effects of a two-SD quinquennial business credit build-up preceding the recession in low (high) friction bankruptcy regimes, instrumented by legal origin. Including standard controls, country fixed effects and controls for credit market depth. Shaded areas denote the 90% confidence interval based on standard errors clustered on countries.

Conclusion

- Business debt has little predictive power for recession trajectories.
- Difference to household debt: swifter resolution of debt.
- Bankruptcy frictions shape economic costs of business debt booms.
- Policy implication: Bolster bankruptcy institutions and move on.

Controls

Contemporaneous (business cycle peak) value as well as two lags of

- real GDP growth
- inflation
- real investment growth
- change in investment-to-GDP ratio

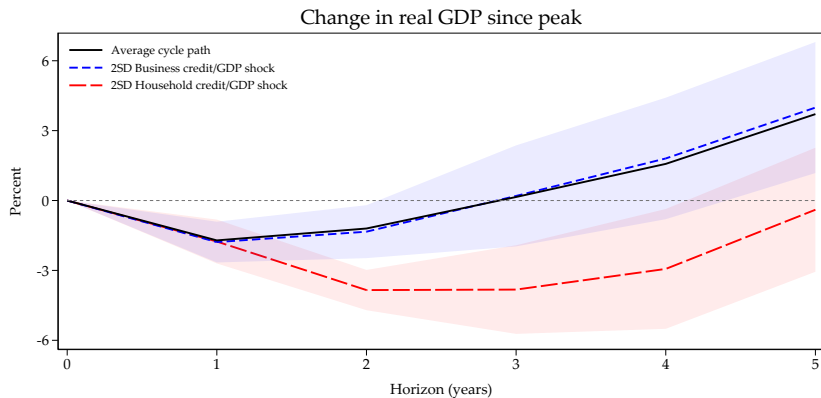
▶ Back

Coefficient estimates

	(1)	(2)	(3)	(4)	(5)
	$h = 1$	$h = 2$	$h = 3$	$h = 4$	$h = 5$
Average cycle α_h	-1.66*** (0.08)	-1.09*** (0.14)	0.36** (0.17)	1.88*** (0.24)	3.95*** (0.34)
Business credit/GDP expansion $\Delta_5 x_{it(p)}^B$	0.25 (1.13)	2.14 (1.56)	-0.68 (2.38)	0.17 (3.81)	2.75 (4.21)
Household credit/GDP expansion $\Delta_5 x_{it(p)}^H$	-5.05 (3.97)	-22.04*** (4.73)	-32.90*** (5.55)	-43.60*** (8.80)	-40.99*** (9.05)
Macro controls	Yes	Yes	Yes	Yes	Yes
$\beta_h^B = \beta_h^H$ (p-value)	0.213	0.000	0.000	0.000	0.000
R^2	0.15	0.35	0.41	0.44	0.48
Cycles	150	150	150	150	149

Notes: Within-estimator, standard errors clustered on countries in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Credit expansion denotes past 5-year change in credit/GDP ratio.

Driscoll-Kraay Standard Errors



Notes: Driscoll-Kraay (1998) standard errors robust to autocorrelated and spatially correlated residuals. Shaded areas denote 95% confidence intervals.

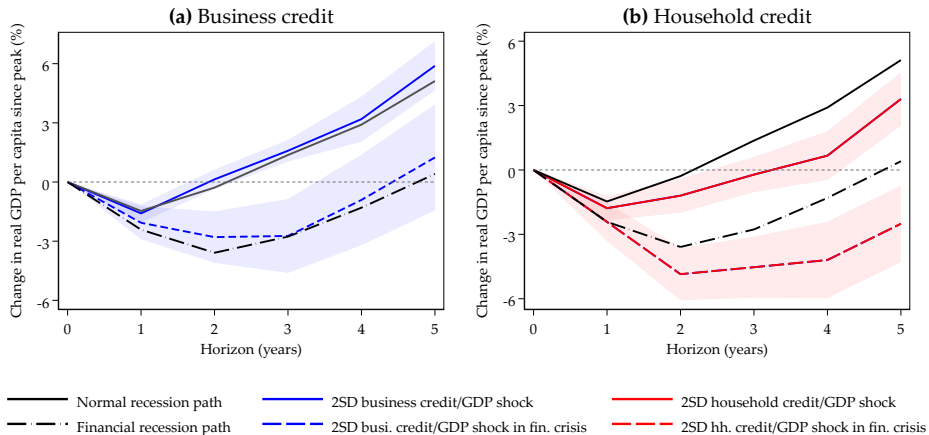
Business cycle peaks followed by financial recessions

Australia	1989
Belgium	2007
Canada	1907
Denmark	1883, 1987, 2007
Finland	1989
France	1929, 2007
Germany	1890, 2008
Ireland	2007, 2010
Italy	1992, 2007
Japan	1997
Netherlands	2008
Norway	1897, 1930, 1987
Portugal	2008
Spain	1925, 1929, 2007
Sweden	1879, 1907, 1930, 1990, 2007
Switzerland	1929, 1990, 2008
UK	1889, 1973, 1990, 2007
USA	1929, 2007

Business cycle peaks followed by normal recessions

Australia	1961, 1973, 1976, 1981, 2008
Belgium	1957, 1974, 1980, 1992, 2011
Canada	1891, 1894, 1903, 1928, 1953, 1956, 1981, 1989, 2007
Denmark	1880, 1887, 1931, 1962, 1973, 1979, 1992, 2011
Finland	1957, 1975, 2008, 2011
France	1905, 1907, 1926, 1933, 1974, 1992, 2011
Germany	1898, 1905, 1908, 1966, 1974, 1980, 1992, 2001
Ireland	1955, 1974, 1982
Italy	1974, 2002, 2011
Japan	1973, 2001, 2007
Netherlands	1957, 1974, 1980, 2001, 2011
Norway	1876, 1881, 1885, 1893, 1902, 1957, 1981, 2007, 2012
Portugal	1973, 1982, 1992, 2002, 2010
Spain	1927, 1952, 1958, 1980, 1992
Sweden	1876, 1881, 1883, 1885, 1888, 1890, 1899, 1901, 1904, 1924, 1980, 2011
Switzerland	1875, 1880, 1886, 1890, 1893, 1899, 1902, 1906, 1933, 1951, 1957, 1974, 1981, 1994, 2001, 2011
UK	1896, 1899, 1902, 1907, 1925, 1929, 1951, 1957, 1979
USA	1926, 1953, 1957, 1969, 1973, 1979, 1981, 1990, 2000

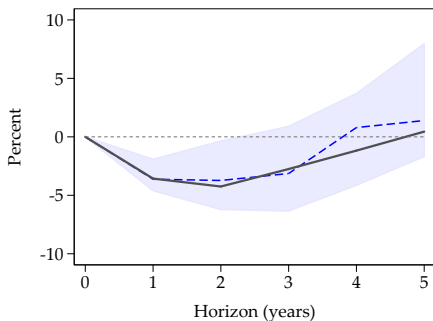
Normal recessions vs. financial crises



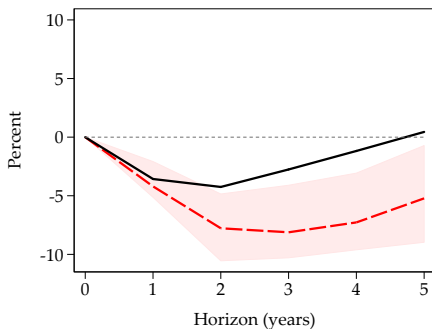
Notes: Predictive effects on growth of a two-SD credit expansion in the five years preceding the normal (financial) recession for business credit booms and household credit booms. Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

Quantile local projections: responses at the 20th percentile

Change in real GDP per capita, t to $t+h$



— Average cycle path
- - - 2SD Business credit/GDP shock



— Average cycle path
- - - 2SD Household credit/GDP shock

Notes: Predictive effects on GDP of a two-SD 5-year business (household) credit buildup preceding the recession. LP series of quantile regressions. Shaded areas denote the 95% confidence interval based on bootstrap replications.

Quantile local projections

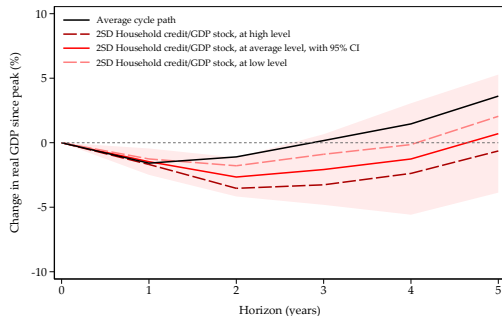
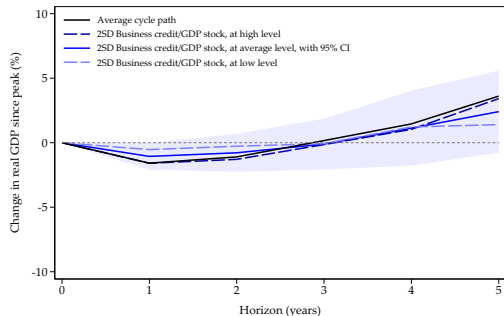
Let a quantile $\tau \in [0, 1]$ of $\Delta_h y_{it(p)+h}$ conditional on $\mathbf{X}_{it(p)}$ be given by

$$Q(\Delta_h y_{it(p)+h} | \mathbf{X}_{it(p)}) = \mathbf{X}_{it(p)} \boldsymbol{\theta}_{h,\tau}$$

Quantile regression consistently estimates $\boldsymbol{\theta}_{h,\tau}$ by weighting residuals asymmetrically, depending on which quantile is targeted:

$$\hat{\boldsymbol{\theta}}_{h,\tau} = \underset{\boldsymbol{\theta}_{h,\tau}}{\operatorname{argmin}} \sum \left(\tau \mathbf{1}(\Delta_h y_{it(p)+h} \geq \mathbf{X}_{it(p)} \boldsymbol{\theta}_{h,\tau}) |\Delta_h y_{it(p)+h} - \mathbf{X}_{it(p)} \boldsymbol{\theta}_{h,\tau}| \right. \\ \left. + (1 - \tau) \mathbf{1}(\Delta_h y_{it(p)+h} < \mathbf{X}_{it(p)} \boldsymbol{\theta}_{h,\tau}) |\Delta_h y_{it(p)+h} - \mathbf{X}_{it(p)} \boldsymbol{\theta}_{h,\tau}| \right)$$

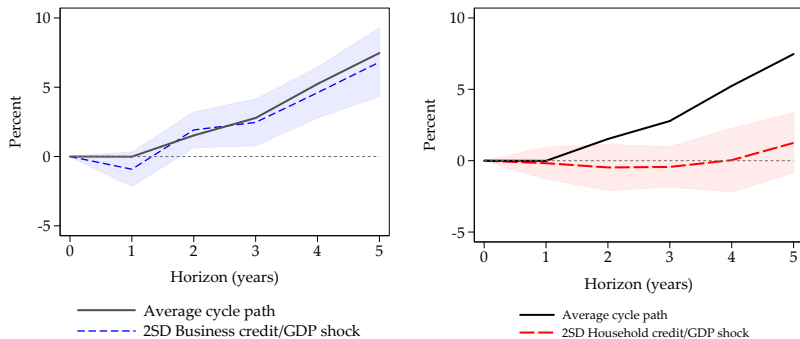
Interacting credit booms with levels



Notes: Predictive effects on growth of a two-SD credit expansion in the five years preceding the recession when at the business cycle peak credit-to-GDP levels stand at i) country-specific historical averages, ii) one standard deviation above country-specific averages or iii) one standard deviation below country-specific averages. The usual set of controls are included. To make sure that credit level trends do not spuriously drive estimates, we include a linear time trend for the pre-WW2 period and—to account for the structural break on credit-to-GDP series—a dummy and separate time trend for the post-WW2 period. Estimates based on all business cycles in 18 advanced economies since 1870. Standard errors are clustered at the country level.

Effects on other macroeconomic aggregates

Change in real consumption p.c.

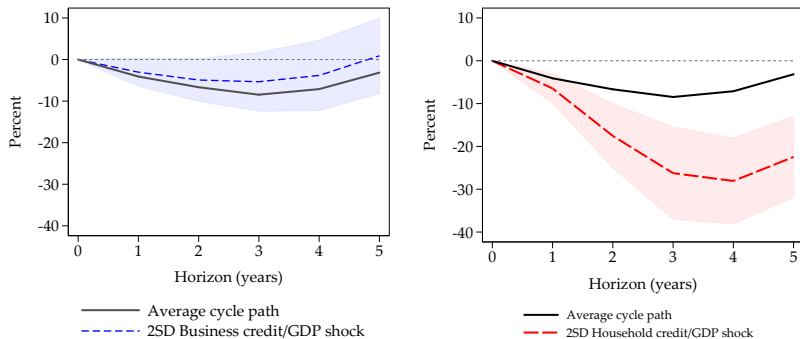


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

▶ Back

Effects on other macroeconomic aggregates

Change in real investment p.c.

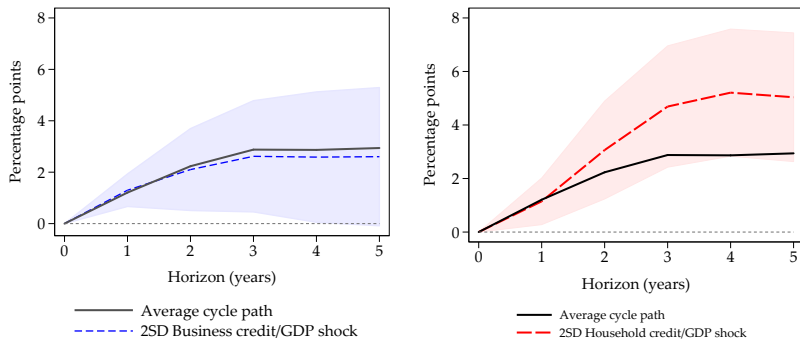


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

▶ Back

Effects on other macroeconomic aggregates

Change in unemployment

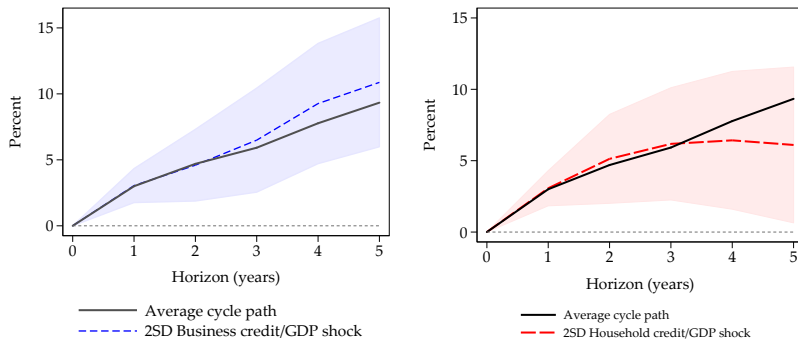


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▶ Back

Effects on other macroeconomic aggregates

Change in CPI

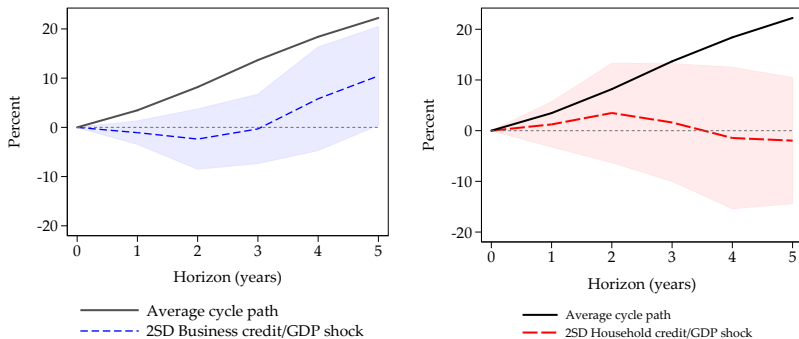


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

▶ Back

Effects on other macroeconomic aggregates

Change in real household credit

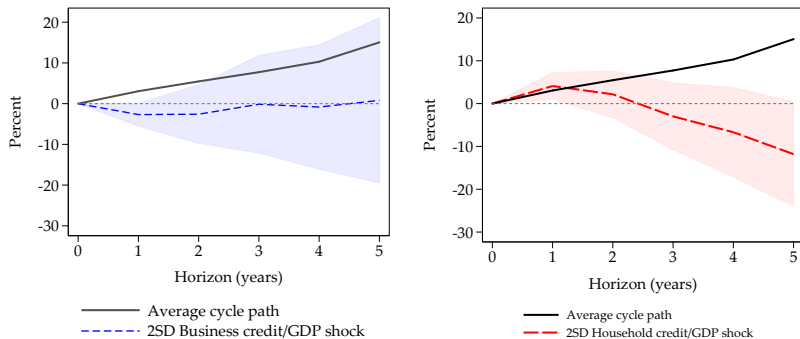


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

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Effects on other macroeconomic aggregates

Change in real business credit

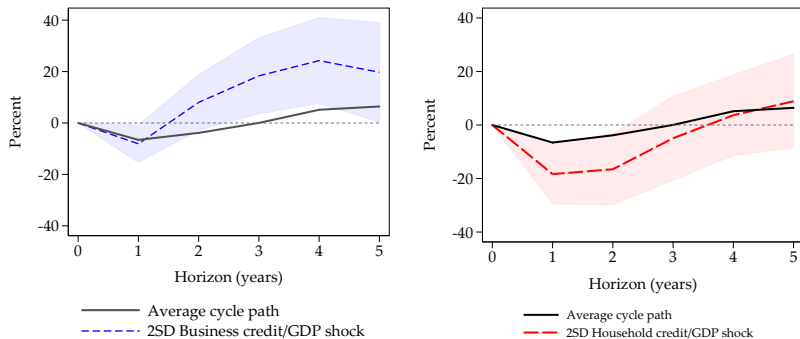


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

▶ Back

Effects on other macroeconomic aggregates

Change in real stock prices

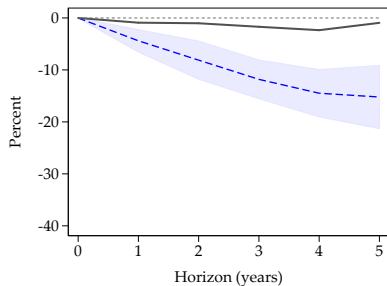


Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

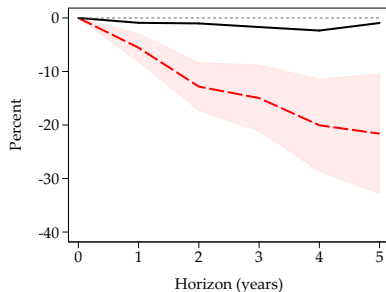
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Effects on other macroeconomic aggregates

Change in real house prices



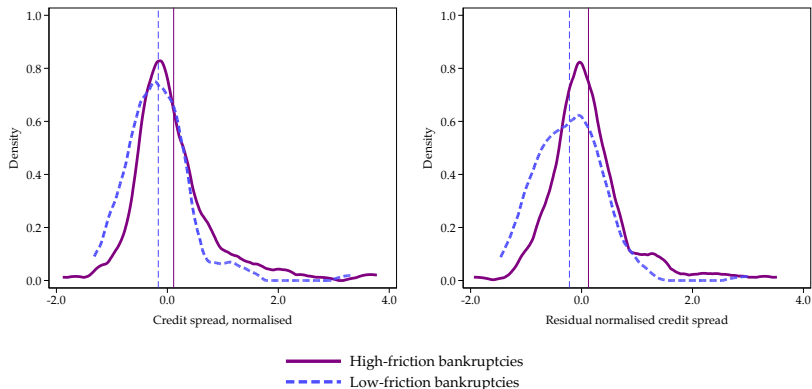
— Average cycle path
- - - 2SD Business credit/GDP shock



— Average cycle path
- - - 2SD Household credit/GDP shock

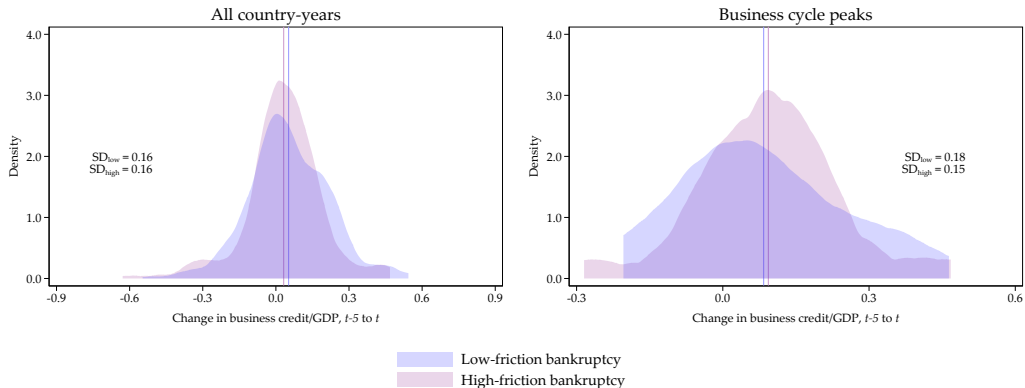
Notes: Standard errors clustered on countries. Shaded areas denote 95% confidence intervals.

Bankruptcy regimes and credit spreads



Notes: Kernel density estimates of normalized credit spreads between high-yield (corporate) and low-yield (government) bonds (Krishnamurty and Muir, 2020), by friction intensity of legal bankruptcy regime. The right panel shows distributions of residuals from a panel regression of credit spreads on country fixed effects and the familiar set of macroeconomic controls. The sample overlap consists of 11 countries, totaling 261 country-years. Vertical lines mark sample averages.

Bankruptcy regimes and business credit booms

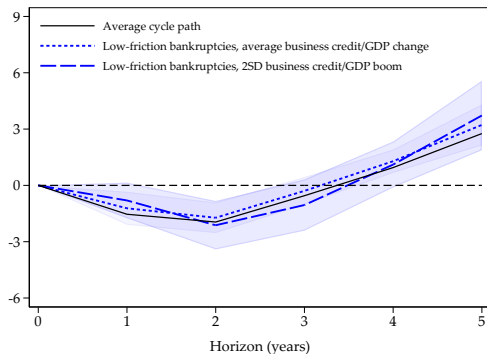
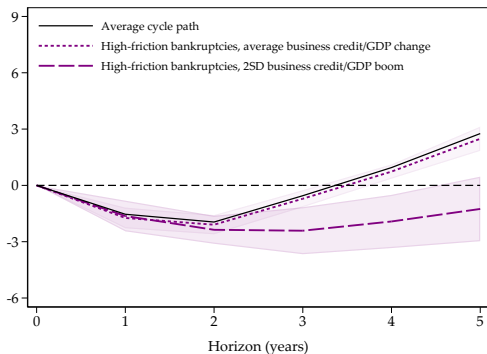


Notes: Kernel density estimates of the change in business credit/GDP from $t - 5$ to t , by bankruptcy regimes. Straight coloured lines indicate mean values.

Bankruptcy frictions: With and without business credit booms I

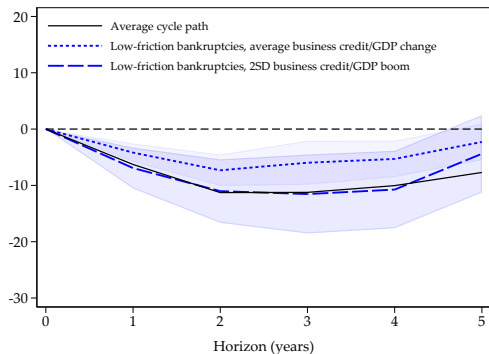
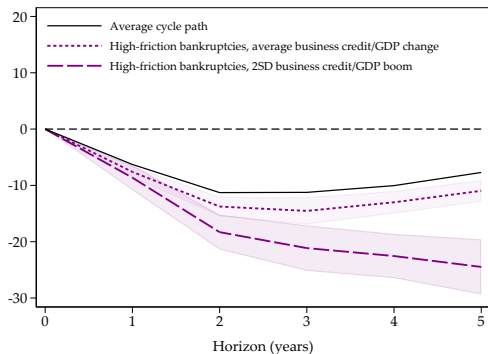
$$\Delta_h y_{it(p)+h} = \alpha_h + \alpha_{hi} + \beta_h^L L_{it} + \beta_h^H \Delta_5 x_{it(p)}^H + \beta_h^B \Delta_5 x_{it(p)}^B + \beta_h^{BL} \Delta_5 x_{it}^B \times L_{it} + \gamma_h \mathbf{w}_{it(p)} + e_{it(p)}$$

Bankruptcy frictions: With and without business credit booms II



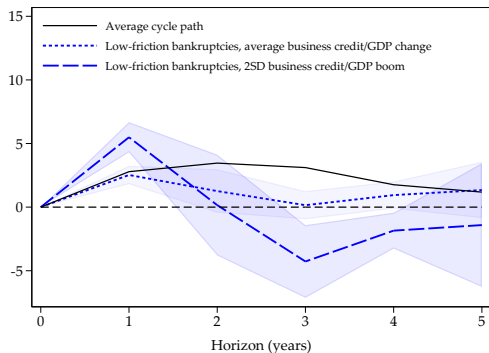
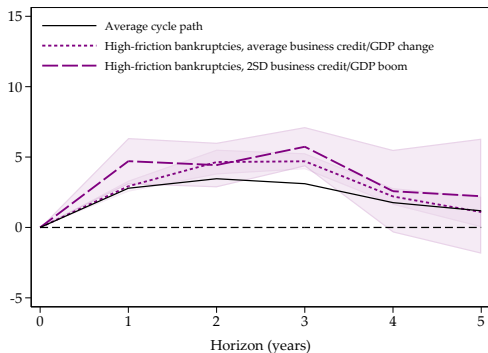
Notes: Predictions for real GDP under high and low legal frictions, with and without business credit booms. Conditional on country fixed effects and the same set of controls as in the baseline setup. 90% CIs shaded based on standard errors clustered on countries.

Bankruptcy frictions: With and without business credit booms III



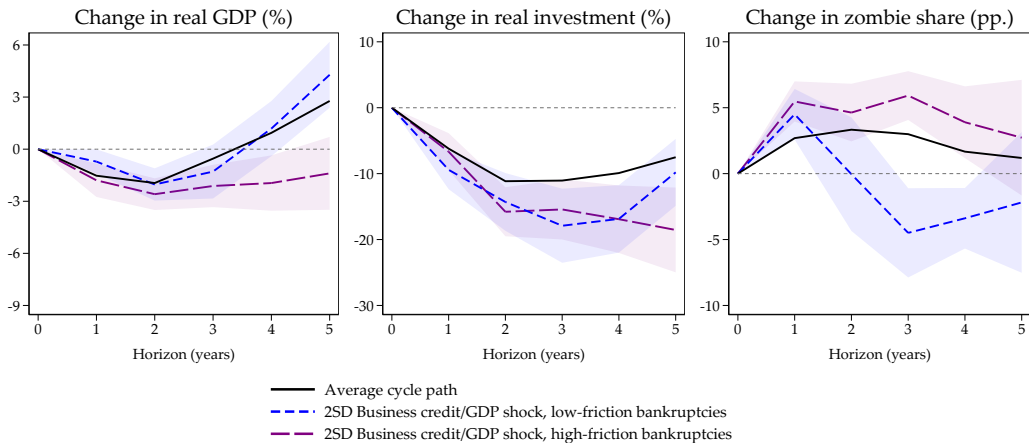
Notes: Predictions for real investment under high and low legal frictions, with and without business credit booms. Conditional on country fixed effects and the same set of controls as in the baseline setup. 90% CIs shaded based on standard errors clustered on countries.

Bankruptcy frictions: With and without business credit booms IV



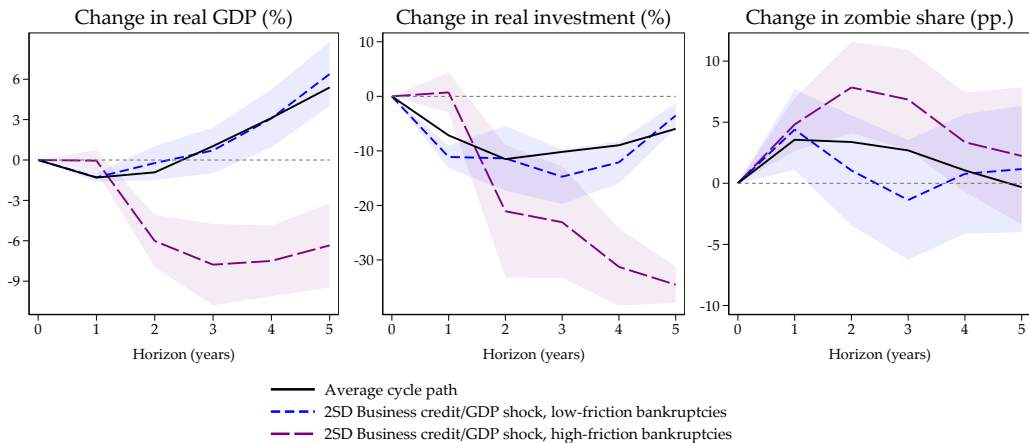
Notes: Predictions for the aggregate zombie share under high and low legal frictions, with and without business credit booms. Conditional on country fixed effects and the same set of controls as in the baseline setup. 90% CIs shaded based on standard errors clustered on countries.

Controlling for credit market development



Notes: Predictions for real GDP, real Investment and the aggregate zombie share under high and low legal frictions, adding the 11-year centered moving average of total bank lending relative to GDP in levels and as interaction with business credit booms. Conditional on country fixed effects and the same set of controls as in the baseline. 90% CIs shaded based on standard errors clustered on countries.

Controlling for banking supervision quality



Notes: Predictions for real GDP, real Investment and the aggregate zombie share under high and low legal frictions, adding an index of banking supervision quality from Abiad, Detragiache and Tressel (2010) in levels and as interaction with business credit booms. Conditional on country fixed effects and the same set of controls as in baseline setup, except that a very small sample for zombie shares ($N = 21$) does not allow to include country fixed effects and macroeconomic controls. 90% CIs shaded based on standard errors clustered on countries.