Financial Liberalizations, Booms, and Crashes

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The views expressed do not necessarily reflect the views
of the Board of Governors of the Federal Reserve System.

Motivation

- Central policy objective: liberalize banking systems to raise growth
- Two views: higher growth (Malaysia, Korea) vs. boom-bust cycle (Japan, Nordics)
  McKinnon (1973); Shaw (1973); Caprio et al. (1994)
  Hellmann et al. (2000); Díaz-Alejandro (1985); Kindleberger and Aliber (2005)
- This tradeoff is central to debates over whether to roll back post-GFC regulation
  Bailey (2025); Lagarde (2025); The Financial Times (2025)

How does banking deregulation affect credit supply, growth, financial stability, and welfare? How does this depend on the type of liberalization?

This paper

- **New database of banking regulation policies**
  - Existing databases yield mixed results, not well documented, and less granular
  - 18 advanced economies, 1946–2020
  - 386 documented policy changes from >1,000 sources across 21 indicators
- Isolate **credit-supply-related policies**
  - Reforms that directly relax lending constraints (asset restr., entry barriers...)
  - Most likely to generate credit deepening...or booms that go bust
- Estimate how different liberalizations affect **credit, growth,** and **crisis risk**
  - Local projections, synthetic control, narratively identified reforms

Main findings

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- Estimates suggest **welfare gains** from deregulation for moderate risk aversion

Literature and contribution: credit supply

- Credit expansions, especially in non-tradables, predict crises and real contractions
  Schularick and Taylor (2012); Jordà et al. (2013); Kalantzis (2015); Baron and Xiong (2017); Mian et al. (2017); Greenwood et al. (2022); Müller and Verner (2024)

- Credit supply relaxations drive credit expansions, but their origins remain unclear
  Mian and Sufi (2018); Mian et al. (2020); Sufi and Taylor (2022); Krishnamurthy and Muir (2025)
  U.S.: Favara and Imbs (2015); Koch (2015); Di Maggio and Kermani (2017); Mian et al. (2020); Adelino et al. (2025)
  - We identify a source of credit supply expansion and trace out its consequences
  - We find substantially stronger effects on credit growth than other indices imply because we identify credit-supply-related policies

Literature and contribution: financial liberalization

Predictions on the effects of financial liberalization

- **Optimistic view:** relaxing constraints expands intermediation and thus growth
  McKinnon (1973); Shaw (1973); Fry (1997); Levine (2005); Rajan and Zingales (1998); ...

- **Pessimistic view:** liberalization fuels credit booms that raise crisis probability
  - Removes restrictions that perform prudential functions
    Díaz-Alejandro (1985)
  - Raises risk-taking and makes banks harder to monitor & discipline
    Hellmann et al. (2000) Barth et al. (2004)
  - Self-reinforcing booms: optimism, collateral feedbacks, excessive leverage
    Kiyotaki and Moore (1997); Lorenzoni (2008); Bordalo et al. (2018); ...

- **Reconciliation:** growth gains with elevated crisis risk during the transition
  Daniel and Jones (2007); Rancière et al. (2008); Rancière and Tornell (2016)

Commercial banking regulation database

(1) Specify five **dimensions** of banking regulation
- A. Restrictions on banks' assets
- B. Restrictions on banks' liabilities
- C. Bank entry barriers
- D. Regulation of the mortgage sector
- E. International financial restrictions

(2) Formulate **indicators** for each dimension, 21 in total

– Examples: A. Do credit ceilings limit overall credit expansion?

B. Do authorities control deposit rates?

C. Do regulations limit geographic expansion or branching?

D. Do regulations set maximum LTV ratios for res. mortgages?

E. Do regulations restrict capital inflows into domestic bank accounts or as bank loans?

Commercial banking regulation database (cont.)

(3) Answer indicators with "regulated" (=0) or "deregulated" (=1) according to a **Coding Guide**

- >1,000 sources: central bank reports, legal texts, secondary literature
- Each reform documented in **Historical Accounts**
- Indicator liberalized when last binding constraint is lifted (e.g., Riegle–Neal)
- Captures presence, but not intensity, of a regulation

(4) Sum all indicators into a single Liberalization Index $\Rightarrow$ **Lib. Index**$_{i,t} \in [0, 21]$

- 386 discrete policy changes

Credit-supply-related policies

- **Selection rule:** policies that directly restrict ...

(i) Quantity or price of lending	(ii) Asset allocation	(iii) Entry & competition in credit markets
Credit ceilings	Reserve requirements	Domestic bank entry
Lending rate controls	Mandatory gov't debt holdings	Foreign bank entry
Mortgage rate controls		Branching
		Banks in mortgage market

- **Supply Index**$_{i,t} \in [0, 9]$; 180 of 386 policy changes

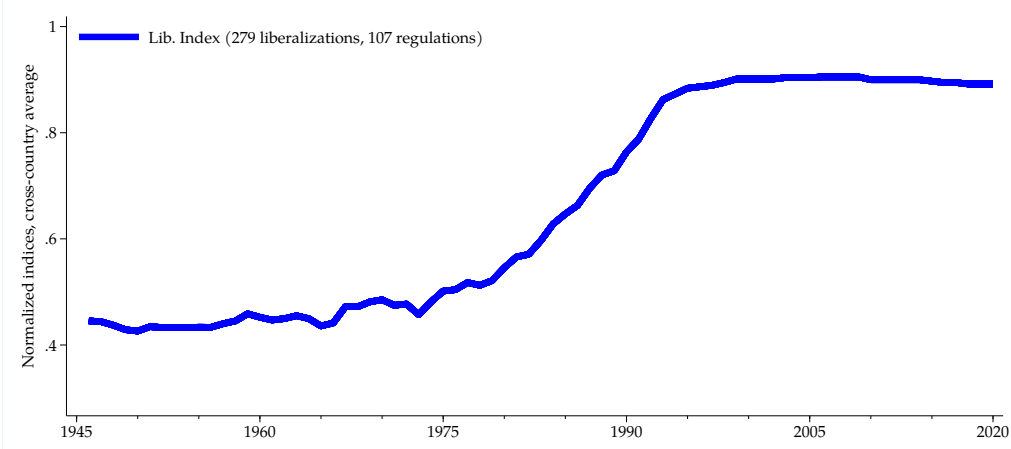
Examples of supply regulation and deregulation policies

Data overview

- Macro-financial variables and financial crisis chronology: Macrohistory Database Jordà et al. (2017)
- Coverage of banking regulation data:

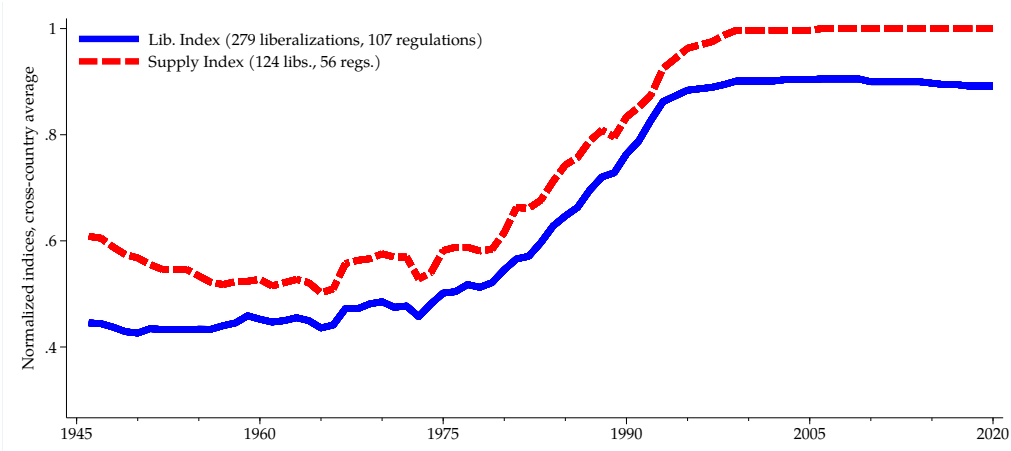
Country	Lib. Index	Country	Lib. Index
Australia	1946–2020	Japan	1949–2020
Belgium	1946–2020	Netherlands	1946–2020
Canada	1946–2020	Norway	1946–2020
Denmark	1946–2020	Portugal	1946–2020
Finland	1946–2020	Spain	1946–2020
France	1946–2020	Sweden	1946–2020
Germany	1948–2020	Switzerland	1946–2020
Ireland	1946–2020	U.K.	1946–2020
Italy	1946–2020	U.S.	1946–2020

Comparison with other liberalization indices



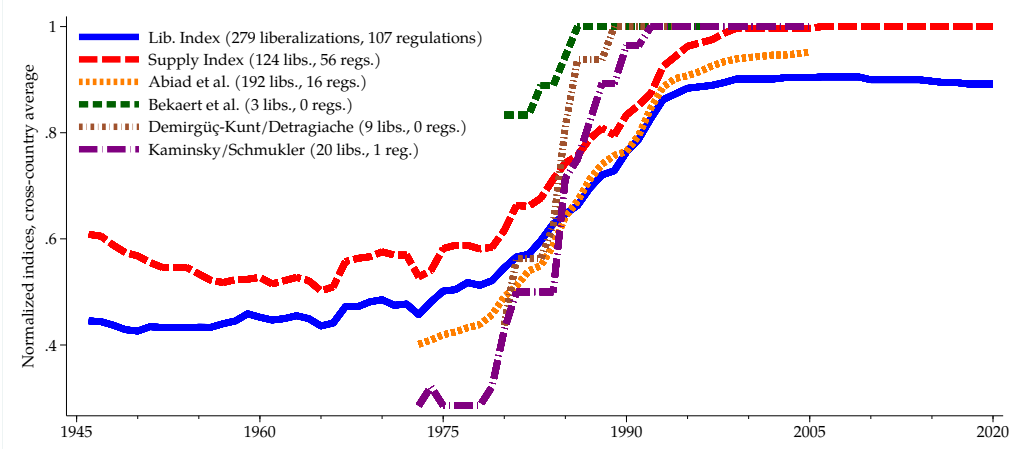
Notes: Normalized total index of this paper for the 18 AEs covered in our study. 0(1) indicates complete regulation (liberalization). Parentheses: number of identified policy changes.

Comparison with other liberalization indices



Notes: Normalized total and supply indices of this paper for the 18 AEs covered in our study. $0(1)$ indicates complete regulation (liberalization). Parentheses: number of identified policy changes.

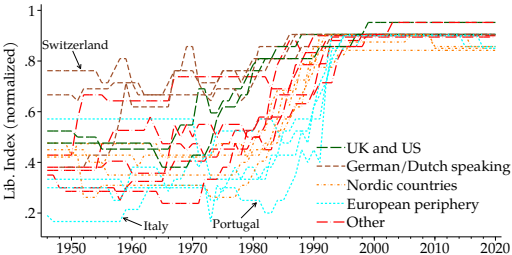
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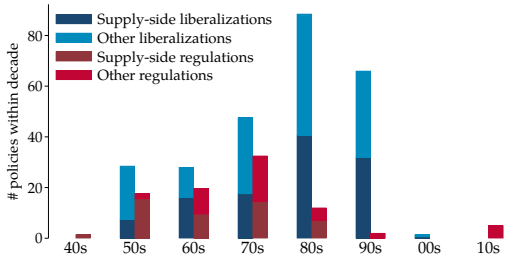
Notes: Normalized total and supply indices of this paper, Abiad et al. (2010), Bekaert et al. (2005), Demirgüç-Kunt and Detragiache (1998), and Kaminsky and Schmukler (2008) for the 18 AEs covered in our study. 0(1) indicates complete regulation (liberalization). Parentheses: number of identified policy changes.

Banking regulation over time

By country



By direction



- Long-run trend with regional waves:
  - Germany: 50s–60s, early, gradual
  - Anglophone: 70s–80s, fin. innovation, inflation, market-based monetary policy
  - Nordics: 80s, regulatory circumvention, international integration
  - Italy, Portugal, Spain: 90s, EEC directives

Individual countries | Histogram

Banking regulation and economic expansions: LP setting

- Estimate impulse responses using **local projections**:
  Jordà (2005)

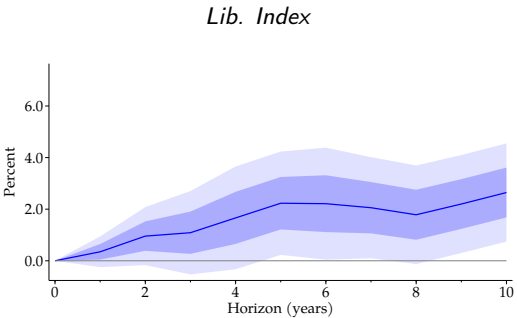
$$\Delta_h y_{i,t+h} = \alpha_i^h + \sum_{k=0}^{5} \boldsymbol{\beta_k^h} \Delta lib_{i,t-k} + \sum_{k=0}^{5} \boldsymbol{\Gamma_k^h} \boldsymbol{X}_{i,t-k} + \sum_{k=0}^{5} \delta_k^h \Delta y_{i,t-k} + u_{i,t+h}$$

- $\boldsymbol{X}$: annual changes in log real GDP p.c., log CPI, log \$ER, Credit/GDP, real ST rates

- Following figures: cum. responses to a unit change in banking regulation *lib*
  - OLS estimates of $\{\boldsymbol{\beta_0^h}\}_{h=1}^{10}$
  - 95% and 68% CIs based on Driscoll-Kraay SEs with ceiling$(1.5 \times h)$ lags

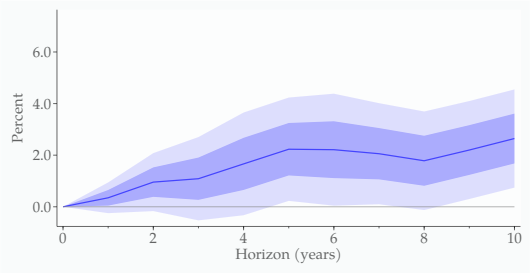
Are banking regulation policies predictable?

Banking deregulation predicts real credit growth

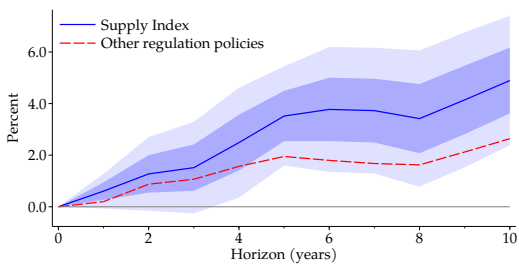


Supply-side banking deregulation predicts real credit growth

Lib. Index



Supply Index

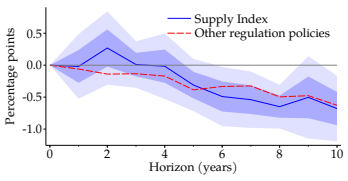


Controlling for other reforms | No controls | Symmetry | Abiad et al. (2010) index

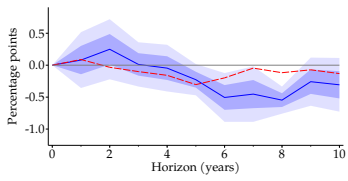
Excluding one indicator / country at a time

Evidence for credit *supply* shifts I: interest rates

Real short-term rates

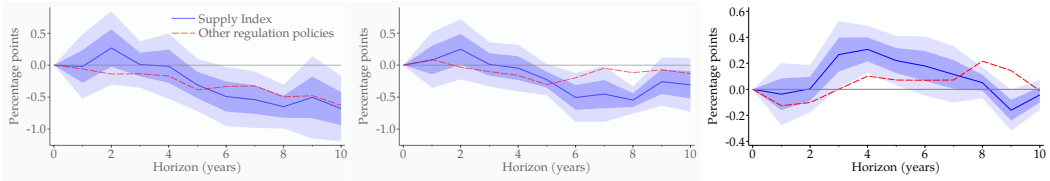


Real long-term rates



Evidence for credit *supply* shifts I: interest rates and spreads

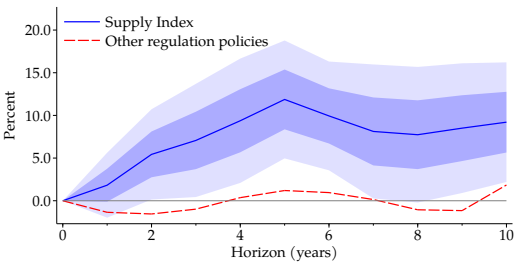
Real short-term rates *Real long-term rates* *Credit spreads*



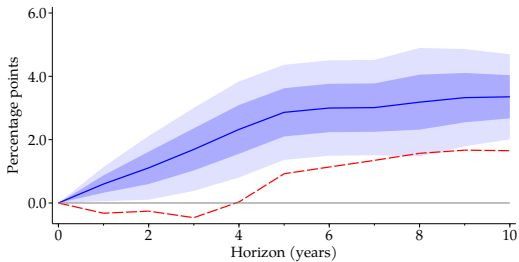
Notes: Spread data come from Krishnamurthy and Muir (2025).

Evidence for credit *supply* shifts II: sectoral credit

Log real credit to real estate sector



Non-tradable credit / tradable credit

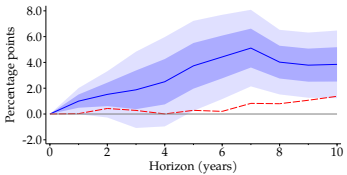


Notes: Data on sectoral credit come from Müller and Verner (2024).

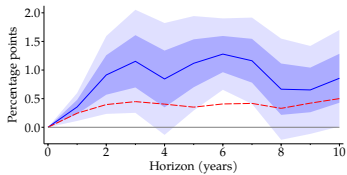
- Typical of credit-supply-induced booms, reinforced by collateral and demand feedbacks Müller and Verner (2024)

Heightened fragility: balance sheet ratios and house prices

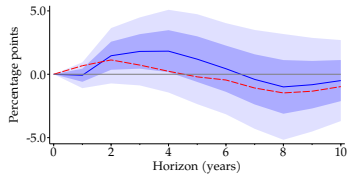
Loan-to-deposit ratio



Non-core ratio



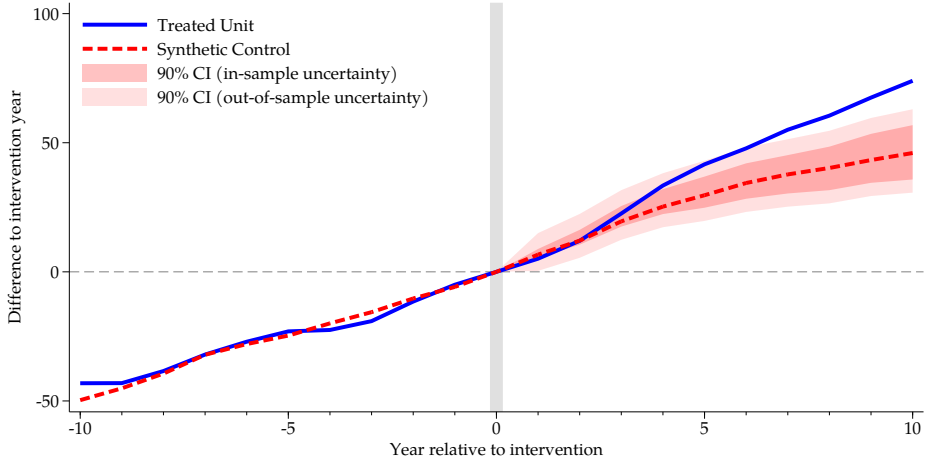
Log real house prices



- Rising loan-to-deposit ratios and non-core funding signal increased risk of bank failures
  Hahm et al. (2013); Correia et al. (2026); Grimm (2026)

- Combination of rapid credit and house price growth $\Rightarrow$ heightened crisis risk
  Greenwood et al. (2022)

Toward causality I: SCM response of real credit



Notes: i is treated with intervention in t if $\Delta_3 Supply\ Index_{i,t} \geq 3$. The synthetic control for each intervention is based on a 10-year window. We show average effects across interventions and CIs based on Cattaneo et al. (2021, 2025).

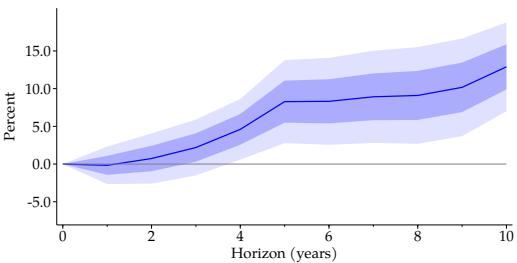
Real estate sector | With additional predictors | Country and time placebos | Different window lengths

Toward causality II: narrative approach

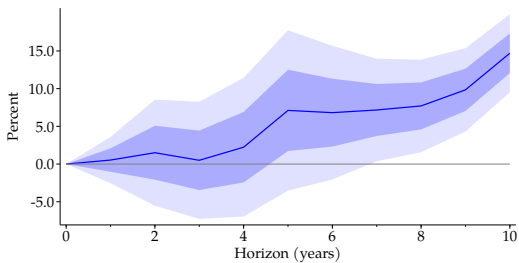
- Identify policies due to institutional/external factors unrelated to econ. conditions
  - 13 deregulation ($z = 1$) and 4 regulation ($z = -1$) policies
  - 8 supply-side policies
- Example: German judicial abolition of branch licensing requirements in 1958
  - Pre-'58: new branches required proof of economic need
  - June 1958: Constitutional Court struck down needs test for pharmacy licenses
    BVerfG (1958)
  - July 1958: Federal Administrative Court applied the precedent to banks
    BVerwG (1958)
- Same LP setting as before, using z as the independent variable
  Macro-financial and policy variables do not predict z

Toward causality II: response of real credit

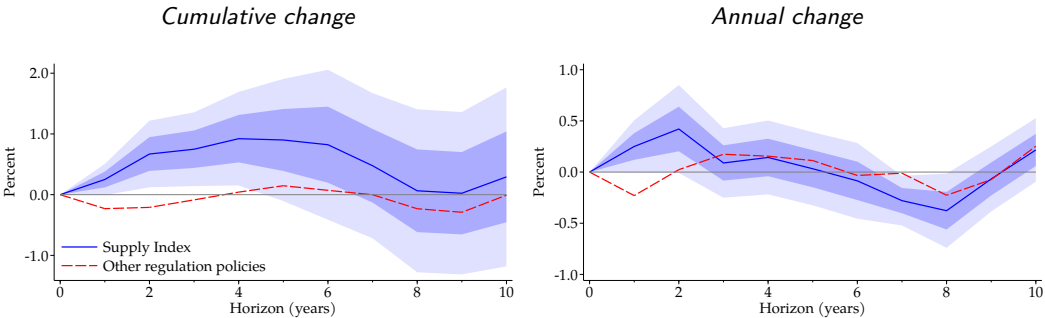
All narrative events



Supply-side narrative events



Supply-side banking deregulation predicts ∩-shaped real GDP



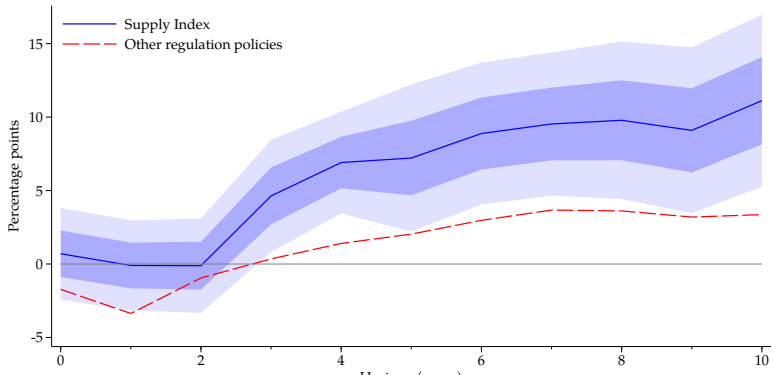
Supply-side banking deregulation predicts left-tail risk in real activity

Three sub-components of the supply index

Excluding one indicator / country at a time

Unemployment and investment

Banking deregulation predicts financial crisis risk



Notes: MLEs of $\{100\beta_0^h\}_{h=1}^{10}$ of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \sum_{k=0}^{5}\beta_k^h \Delta lib_{i,t-k} + \sum_{k=0}^{5}\Gamma_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$. We show average marginal effects and 95% and 68% CIs based on country-based cluster-robust SEs. p_{t+h}: prob. that crisis occurs between t and $t+h$. $\boldsymbol{X}$: as before except change in Credit/GDP ratio.

Alternative crisis chronologies | Alternative estimation methods | No country FEs | No controls | Hairplots

Quartile regressions | Abiad et al. (2010) index | Controlling for other policy dimensions | SCM estimates

The welfare tradeoff of banking deregulation

- **Initial boom vs. higher crisis risk**: welfare effect depends on **risk aversion**
  - Costs from heightened crisis risk may more than offset higher average growth
  - Financial crisis losses themselves differ widely; some are large and long-lasting Romer and Romer (2017)

The welfare tradeoff of banking deregulation

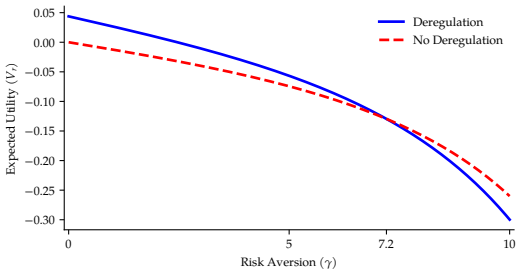
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    Romer and Romer (2017)

- **Approach**: compare expected utility with and without deregulation
  (1) Estimate distribution of consumption losses across 82 banking crises
  (2) Use our consumption and crisis-risk estimates to recover no-crisis consumption
  (3) Weight utility of crisis and no-crisis paths by crisis risk and loss distribution

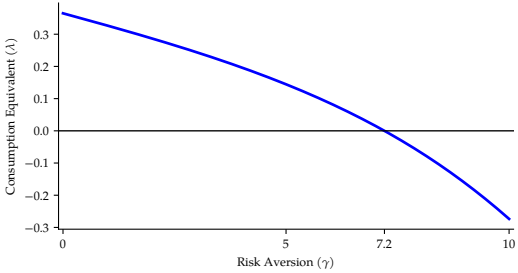
Welfare criterion and loss model Estimation details

The estimated welfare effects of deregulation are positive for moderate risk aversion

Expected utility



Consumption equivalent in %



No-crisis counterfactual consumption paths

Conclusion

- New database: 386 postwar banking regulation policy changes across 18 AEs
- Credit-supply-related deregulation expands (non-tradable) credit supply...
- ...and coincides with a hump-shaped GDP response due to heightened crisis risk
- Net gains of banking deregulation remain positive for moderate risk aversion
- Many non-AEs still face core regulatory constraints that AEs abolished decades ago
  Calice et al. (2020); World Bank (2021)

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Complete overview of indicators: credit-supply-related policies

(1) Can commercial banks operate in the mortgage market?

(2) Do regulations restrict entry by foreign banks?

(3) Do regulations restrict entry by domestic banks?

(4) Do regulations limit geographic expansion or branching?

(5) Do authorities regulate mortgage interest rates?

(6) Do ceilings limit overall credit expansion?

(7) Do authorities control lending rates?

(8) Do reserve requirements apply?

(9) Must banks hold government securities?

Back

Complete overview of indicators: other liberalization policies

(10) Do capital adequacy requirements cover residential mortgages?

(11) Does a public mortgage securitization program exist?

(12) Do regulations set maximum LTV ratios for residential mortgages?

(13) Can commercial banks conduct investment-banking activities?

(14) Is the exchange rate system unified?

(15) Do regulations restrict inflows of portfolio investment?

(16) Do regulations restrict capital inflows into domestic bank accounts or as bank loans?

(17) Do regulations restrict outflows of portfolio investment?

(18) Can banks lend to nonresidents/foreigners?

(19) Do regulations specify capital adequacy rules?

(20) Do authorities control deposit rates?

(21) Can banks issue certificates of deposit?

Back

Literature and contribution: financial liberalization

- Literature constructing liberalization indices across various dimensions
  Cukierman et al. (1992); La Porta et al. (1998, 2006); Reddy et al. (2020)
  - We build a transparent banking regulation database from historical accounts

Literature and contribution: financial liberalization

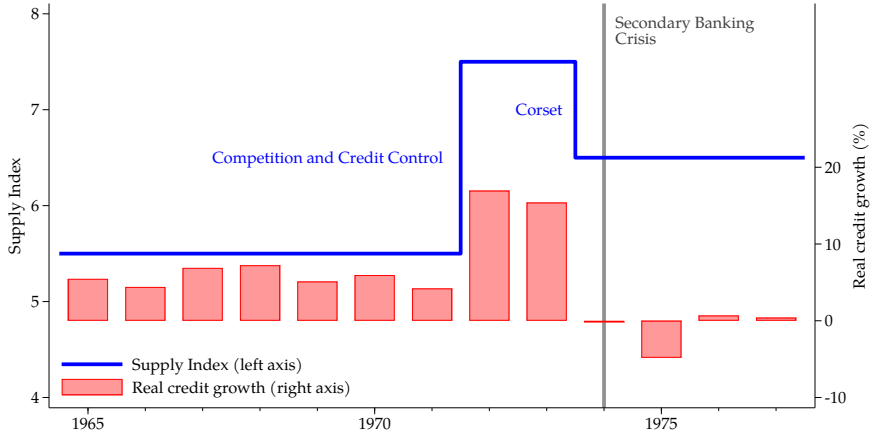
- Literature constructing liberalization indices across various dimensions
  Cukierman et al. (1992); La Porta et al. (1998, 2006); Reddy et al. (2020)
  - We build a transparent banking regulation database from historical accounts
- Existing liberalization indices are limited in time span, scope, and transparency
  Demirgüç-Kunt and Detragiache (1998); Kaminsky and Reinhart (1999); Mehrez and Kaufmann (1999); Laeven (2003); Bekaert et al. (2005); Kaminsky and Schmukler (2008); Abiad et al. (2010)
  - We extend coverage, broaden policy dimensions, and document every policy
  - We specifically classify policies that directly affect credit supply restrictions

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  - We extend coverage, broaden policy dimensions, and document every policy
  - We specifically classify policies that directly affect credit supply restrictions
- Evidence on the consequences of financial liberalization
  Demirgüç-Kunt and Detragiache (1998); Kaminsky and Reinhart (1999); Mehrez and Kaufmann (1999); Galindo et al. (2007); Baron and Green (2025); Dai et al. (2025)
  - We show how banking deregulation affects booms and busts, by policy type

Back

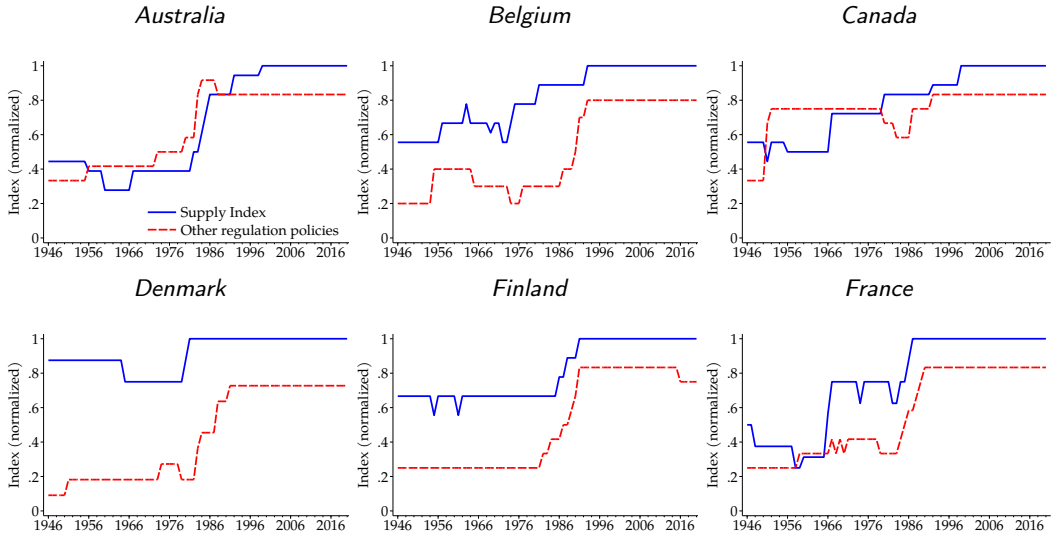
Example: U.K. deregulation in 1971



Notes: U.K. Supply Index (left axis) and annual growth in real private credit (right axis). The gray line indicates the Secondary Banking Crisis (Jordà et al., 2017). Competition and Credit Control abolished credit ceilings and the clearing banks' interest rate cartel in September 1971. The Corset temporarily restricted credit growth from December 1973 to June 1980.

Back

Time series for individual countries



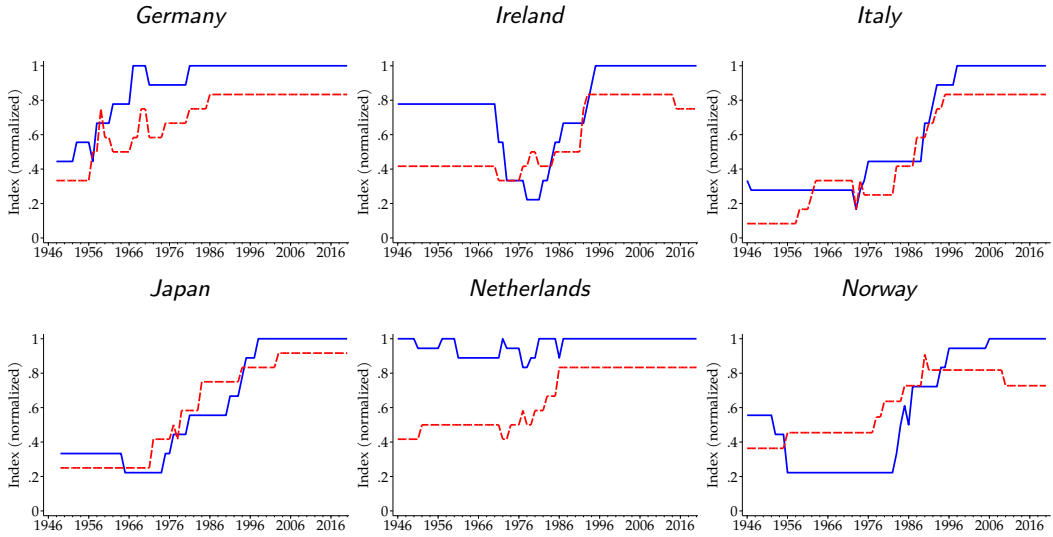
Back

Examples of supply regulation and deregulation policies

- U.K. 1955: **credit ceilings** imposed; removed 1971 **CCC**
  Aikman et al. (2016)
- Norway 1953: Interest Act allowed authorities to set **bank lending rate ceilings**
  Andersen (2011)
- Sweden 1983: liberalization of **mortgage rates**
  Englund et al. (1996)
- Belgium 1946: introduction of mandatory **government bond holdings**
  Wyplosz (1999)
- Germany 1958: removal of needs test for **bank entry**
  Bundesbank (1959)
- Portugal 1993: **bank entry restrictions** fully liberalized following EEC accession
  Decree-Law 298/92

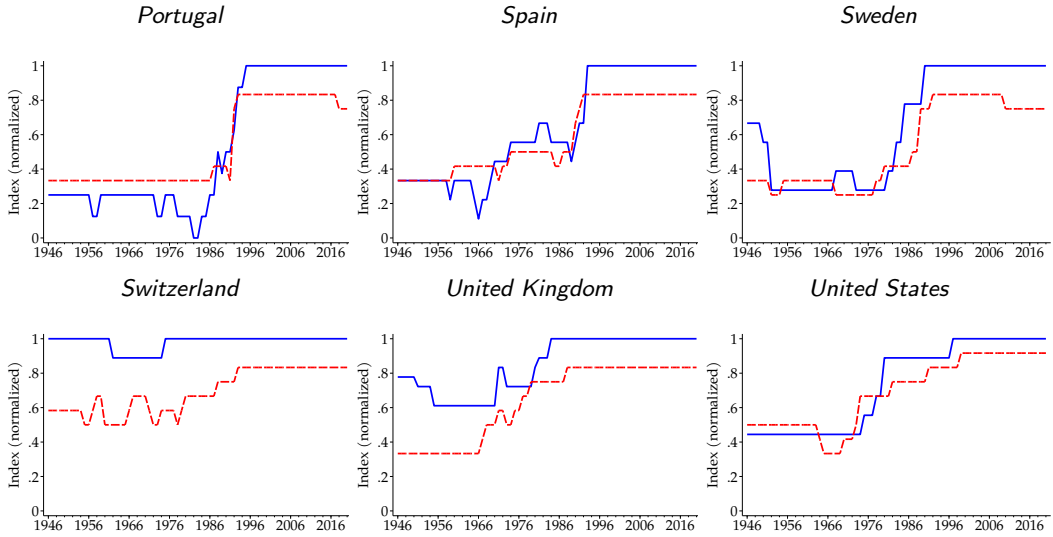
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Time series for individual countries



Back

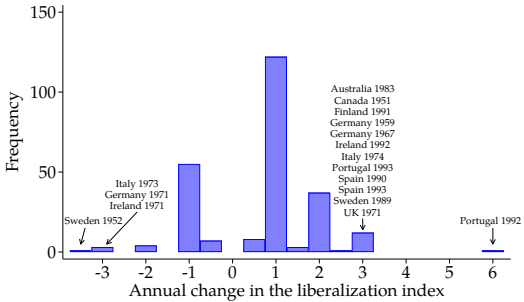
Time series for individual countries



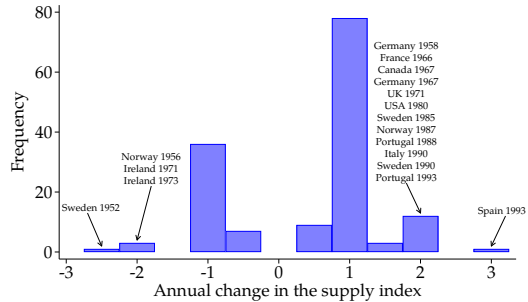
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Distribution of index changes

Distribution of ΔLib. Index ≠ 0



Distribution of ΔSupply Index ≠ 0



Back

Do macro-financial variables predict banking regulations?

	Complete index		Supply index	
	(1)	(2)	(3)	(4)
	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$
$\Delta_3 \log$ real GDP p.c.$_t$	0.017**	0.010***	0.005	0.006*
	(0.007)	(0.003)	(0.004)	(0.003)
$\Delta_3 \log CPI_t$	0.024***	0.012***	0.009***	0.007***
	(0.004)	(0.002)	(0.002)	(0.001)
$\Delta_3 ST\ Real\ Rate_t$	0.011	0.002	0.010	0.002
	(0.010)	(0.005)	(0.007)	(0.004)
$\Delta_3 \log USD\ ER_t$	-0.005	-0.002**	-0.001	-0.001
	(0.003)	(0.001)	(0.002)	(0.001)
$\Delta_3 (Credit/GDP)_t$	0.002	-0.000	0.001	0.001
	(0.003)	(0.002)	(0.002)	(0.001)
Crisis between $t-3$ and t	0.052	0.024	0.023	-0.024
	(0.120)	(0.062)	(0.058)	(0.060)
$\Delta_3 index_t$	0.178***	0.062***	0.135***	0.050***
	(0.052)	(0.015)	(0.046)	(0.016)
Estimation	OLS	Logit	OLS	Logit
Country FEs	✓	✓	✓	✓
Countries	18	18	18	18
Observations	1219	1219	1219	1219
AUROC		0.785		0.762

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Back

Do political variables predict banking regulations?

	Complete index		Supply index	
	(1)	(2)	(3)	(4)
	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$
Rightist head of government$_t$	-0.058	-0.112	-0.149	-0.095
	(0.189)	(0.078)	(0.117)	(0.065)
Leftist head of government$_t$	-0.103	-0.084	-0.136	-0.068
	(0.165)	(0.064)	(0.105)	(0.055)
Free Market Economy$_t$	-0.003	0.007	0.016	0.021*
	(0.046)	(0.014)	(0.028)	(0.013)
Positive Incentives$_t$	-0.022	-0.007	-0.004	-0.004
	(0.018)	(0.006)	(0.019)	(0.012)
Free Trade and Open Markets$_t$	-0.132	-0.031	-0.012	0.019
	(0.141)	(0.086)	(0.066)	(0.055)
Trade liberalization between $t-3$ and t	-0.572***	-0.109	-0.228	-0.007
	(0.193)	(0.112)	(0.135)	(0.077)
Δ_3 *index*$_t$	0.191***	0.077***	0.134**	0.052***
	(0.054)	(0.017)	(0.050)	(0.020)
Estimation	OLS	Logit	OLS	Logit
Country FEs	✓	✓	✓	✓
Countries	18	18	18	18
Observations	1117	1117	1117	1117
AUROC		0.681		0.678

Notes: Rightist head of government$_t$ and Leftist head of government$_t$ captures the ideology of political leaders (Herre, 2023) in t. Free Market Economy$_t$, Positive Incentives$_t$, and Free Trade and Open Markets$_t$ capture the emphasis on these economic policies in the manifestos of all parliamentary parties in t (Lehmann et al., 2025). Trade liberalization between $t-3$ and t equals 1 if a country has a Wacziarg and Welch (2008) trade liberalization date between $t-3$ and t and 0 otherwise.

Back

Do fiscal consolidation variables predict banking regulations?

	Complete index		Supply index	
	(1)	(2)	(3)	(4)
	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$
Fiscal consolidation between $t-2$ and t	-0.072***	0.001	-0.044***	-0.013
	(0.023)	(0.012)	(0.013)	(0.012)
$\Delta_3 \left(Gov.\ Debt / GDP\right)_t$	0.001	0.000	0.002	-0.000
	(0.005)	(0.002)	(0.004)	(0.002)
$\Delta_3\ index_t$	0.292***	0.109***	0.168***	0.074***
	(0.052)	(0.016)	(0.041)	(0.019)
Estimation	OLS	Logit	OLS	Logit
Country FEs	✓	✓	✓	✓
Countries	16	16	16	16
Observations	602	602	602	602
AUROC		0.768		0.745

Notes: Fiscal consolidation between $t-2$ and t is the sum of the fiscal consolidation measures adopted in $t-2$, $t-1$, and t, in percent of GDP according to the IMF Action-based Dataset of Fiscal Consolidation (Adler et al., 2024).

Back

Does capital account openness predict banking regulations?

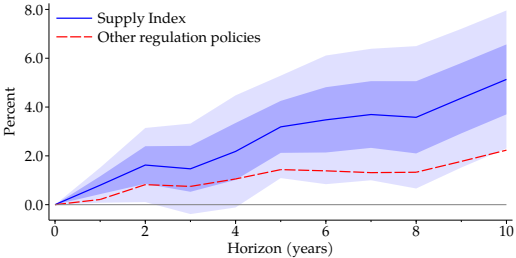
	Complete index		Supply index	
	(1)	(2)	(3)	(4)
	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$	$\Delta_{t+3} index_{t+3}$	$\mathbb{1}\{\Delta_{t+3} index_{t+3} > 0\}$
Δ_3 Capital account openness$_t$	-0.687	-0.072	0.106	0.169
	(0.621)	(0.232)	(0.271)	(0.199)
Δ_3 *index*$_t$	0.273***	0.097***	0.142***	0.055***
	(0.043)	(0.017)	(0.038)	(0.021)
Estimation	OLS	Logit	OLS	Logit
Country FEs	✓	✓	✓	✓
Countries	18	17	18	17
Observations	775	756	775	756
AUROC		0.709		0.690

Notes: Δ_3 Capital account openness is the change from $t-3$ to t in the Chinn and Ito (2006) Capital Account Openness Index.

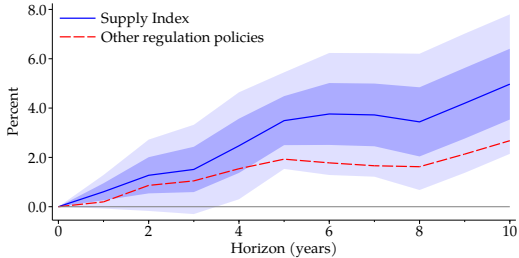
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Controlling for other reforms

Trade liberalization



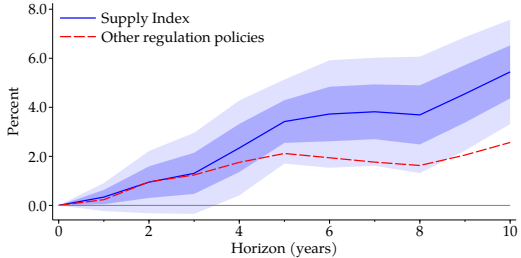
Ideology of political leaders



Left panel: We additionally control for lags 0 to 5 of Wacziarg and Welch (2008) trade liberalization dates.
Right panel: We additionally control for two binary variables that capture the ideology of political leaders using the database constructed by Herre (2023). The first variable equals 1 if country i has a rightist head of government in year t and 0 otherwise. The second variable equals 1 if country i has a leftist head of government in year t and 0 otherwise.

Back

Controlling for parliamentary economic orientation

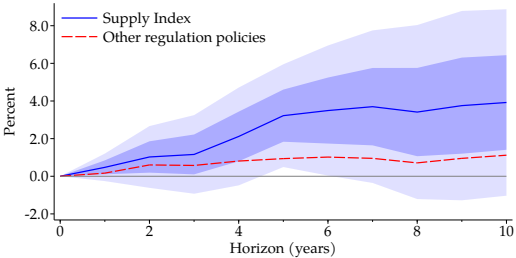


Notes: We additionally control for three variables that capture the relative emphasis placed on key economic policy dimensions in the manifestos of all parties represented in parliament in a given year, as coded in the Manifesto Project Dataset (Lehmann et al., 2025). The first variable (per401) measures favorable mentions of the free market and free-market capitalism as an economic model. The second variable (per402) captures favorable mentions of supply-side-oriented economic policies (assistance to businesses rather than consumers). The third variable (per407) measures support for the concept of free trade and open markets and calls for abolishing all means of market protection (in the manifesto or any other country). All variables represent the share of quasi-sentences devoted to the respective topic and are expressed as percentages.

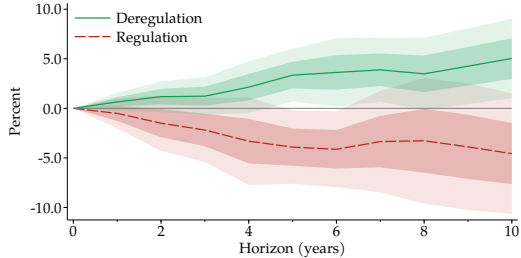
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Excluding all control variables and symmetry check

No controls



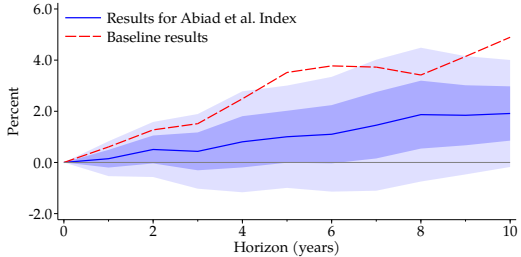
Deregulation vs. regulation



Left panel: The same notes as in the main part apply with one modification; here, we exclude control variables. *Right panel:* OLS estimates of $\{\beta_D^h\}_{h=1}^{10}$ and $\{\beta_R^h\}_{h=1}^{10}$ of $\Delta_h y_{i,t+h} = \alpha_i^h + \beta_D^h \Delta deregulation_{i,t} + \beta_R^h \Delta regulation_{i,t} + \sum_{k=1}^{5} \beta_k^h \Delta lib_{i,t-k} + \sum_{k=0}^{5} \boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + \sum_{k=0}^{5} \delta_k^h \Delta y_{i,t-k} + u_{i,t+h}$. Shaded areas denote 95% CIs.

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Responses to the Abiad et al. (2010) index

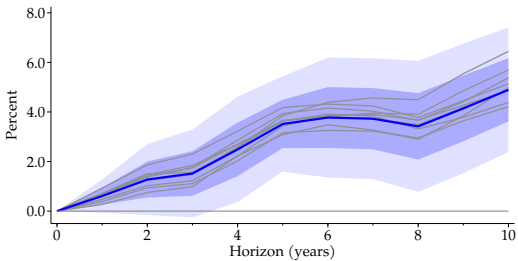


Notes: We replace our index with the Abiad et al. (2010) financial liberalization index.

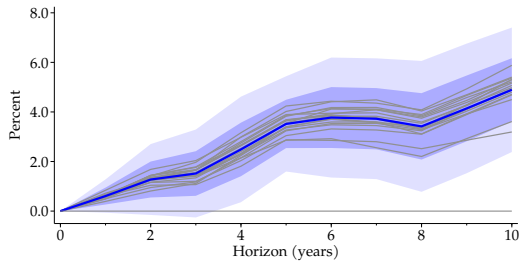
Back

Excluding one indicator / country at a time (hairplots)

Excluding one indicator at a time



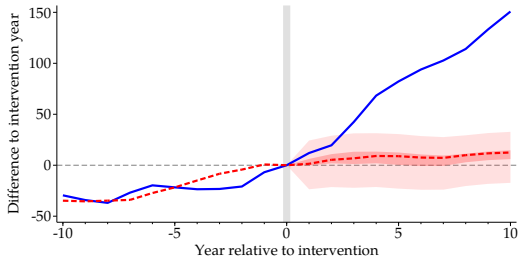
Excluding one country at a time



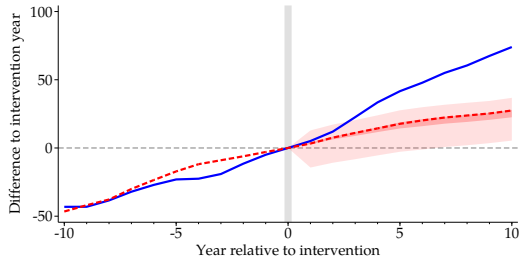
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Extensions

Log real credit to real estate sector



With additional predictors

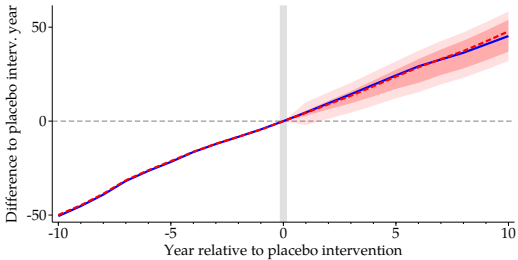


Left panel: The same notes as in the main part apply with one modification; here, the dependent variable refers to log real credit to real estate sector. Data on sectoral credit come from Müller and Verner (2024).
Right panel: The included predictors (averaged over the pre-treatment period) are changes in Supply Index, log CPI, and real GDP p.c.

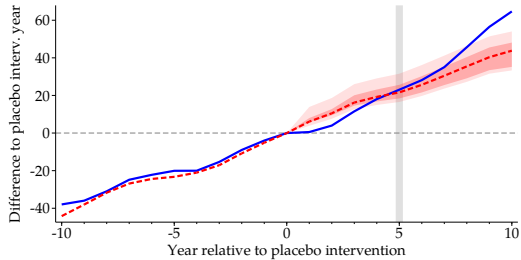
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Country and time placebos

Country placebos



Time placebos

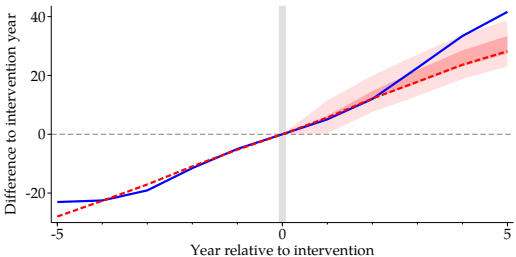


Left panel: We assign the intervention to another country in the donor pool, include the treated unit in the donor pool, and re-estimate the model in the same way as in the main part. We do that for all countries and intervention years and show average treated-unit and synthetic control paths.
Right panel: We shift the treatment of all interventions five years backward and show average treated-unit and synthetic control paths.

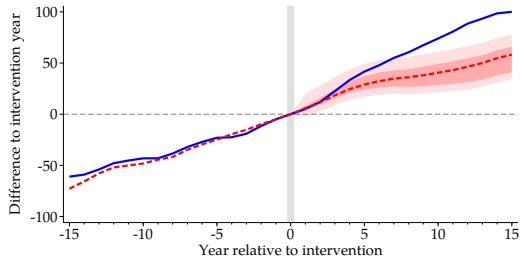
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Different window lengths

5-*year window*



15-*year window*



Notes: We construct the synthetic control based on a 5-year or 15-year window.

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Macro-financial and policy variables do not predict z

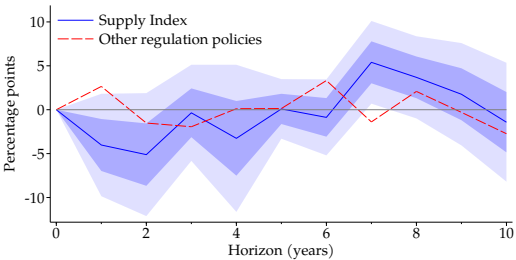
Dep. var.: z_{t+1}	All narrative events (1)	(2)	(3)	Credit-supply-related events (4)	(5)	(6)
$\Delta_3 \log$ *CPI*$_t$	0.006		0.011	0.019		0.040*
$\Delta_3 \log$ *Real GDP*$_t$	0.087		0.148	0.050		0.083
Δ_3*ST Real Rate*$_t$	-0.024		-0.002	-0.025		-0.027
$\Delta_3 \log$ *USD ER*$_t$	-0.011		-0.011	-0.010		-0.012
Δ_3*Credit / GDP*$_t$	0.019		0.020	-0.001		0.002
Crisis$_{t-2,t}$	0.009		0.011	0.010		0.011
Rightist head of government$_t$		-0.010	-0.007		-0.006	-0.003
Leftist head of government$_t$		-0.014*	-0.012*		-0.010	-0.008
Free Market Economy$_t$		-0.000	-0.001		0.001	0.001
Positive Incentives$_t$		-0.001	-0.001		-0.000	-0.000
Free Trade and Open Markets$_t$		0.006	0.008*		0.009*	0.011**
Trade Liberalization$_t$		-0.012	-0.015*		-0.009*	-0.009*
Controls	✓	✓	✓	✓	✓	✓
Country FEs	✓	✓	✓	✓	✓	✓
Observations	1293	1198	1186	1293	1198	1186
Countries	18	18	18	18	18	18

Notes: OLS estimates of $\mathbf{\Gamma}$ of $z_{i,t+1} = \alpha_i + \mathbf{\Gamma} \boldsymbol{X}_{i,t} + u_{i,t+1}$. Variables included in $\boldsymbol{X}$ are listed in the table and explained in the paper. ** $p < 0.05$, * $p < 0.1$.

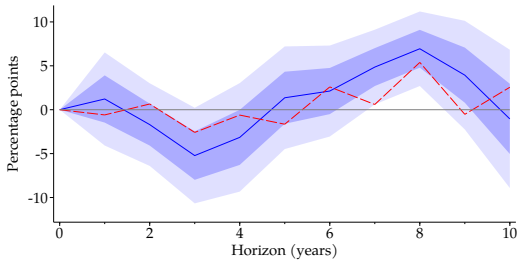
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Supply-side banking deregulation predicts left-tail risk in real activity

$\mathbb{1}\{\Delta \log \textit{real GDP p.c.}_{i,t+h} < 20^{th} \textit{ percentile}\}$



$\mathbb{1}\{\Delta \textit{unemployment}_{i,t+h} > 80^{th} \textit{ percentile}\}$

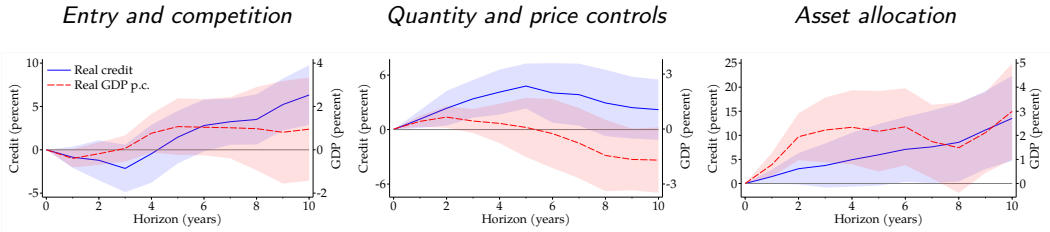


Notes: MLEs of $\{100\beta_0^h\}_{h=1}^{10}$ of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \sum_{k=0}^{5}\beta_k^h \Delta lib_{i,t-k} + \sum_{k=0}^{5}\boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$. Point estimates: average marginal effects. Shaded areas: 95% and 68% CIs based on country-based cluster-robust SEs. p_{t+h} is specified in the panel titles.

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Three sub-components of the supply index

Cumulative changes



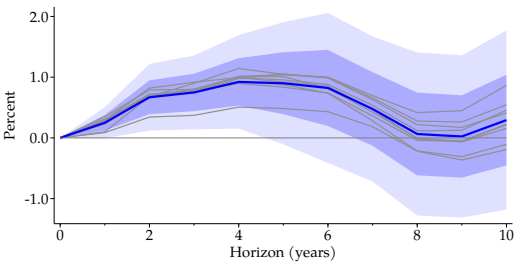
Notes: Shaded areas indicate 90% CIs based on country-based cluster-robust SEs.

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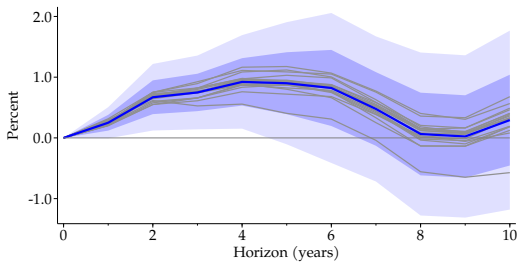
Excluding one indicator / country at a time (hairplots)

Cumulative changes

Excluding one indicator at a time



Excluding one country at a time

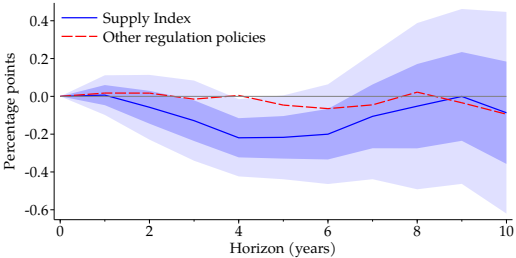


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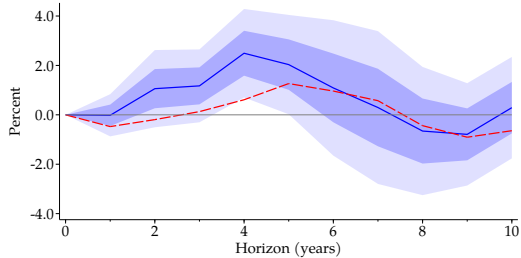
Unemployment and investment

Cumulative changes

Unemployment rate



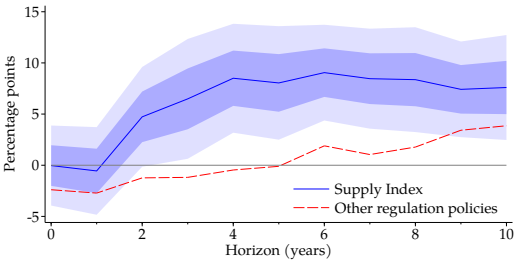
Log real investment p.c.



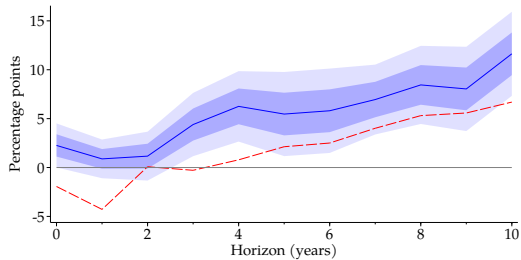
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Alternative crisis chronologies

Baron et al. (2021) crisis chronology



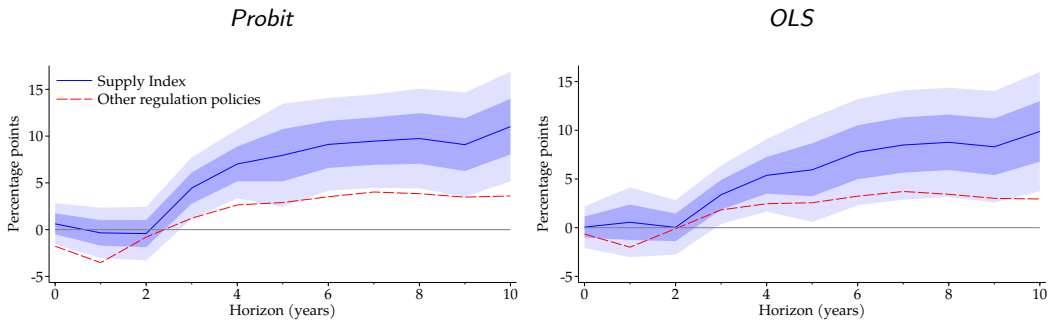
Reinhart and Rogoff (2009) crisis chronology



Notes: The same notes as in the main part apply with one modification; here, we replace the JST financial crisis dates with those provided by Baron et al. (2021) (left) and Reinhart and Rogoff (2009) (right).

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Alternative estimation methods

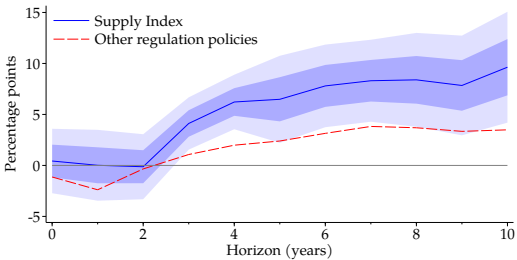


Notes: The same notes as in the main part apply with one modification; here, we estimate a probit model (left) or a linear probability model (right).

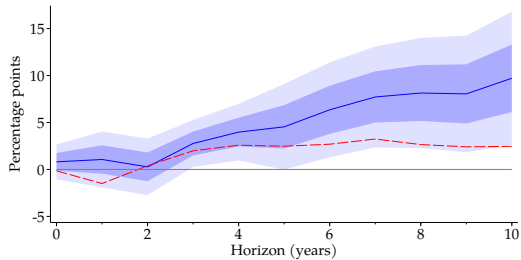
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No country FEs or no controls

No country FEs



No controls

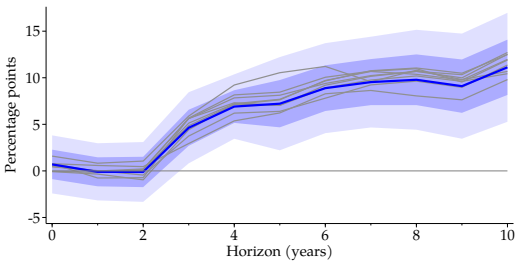


Notes: The same notes as in the main part apply with one modification; here, we exclude country fixed effects (left) or control variables (right).

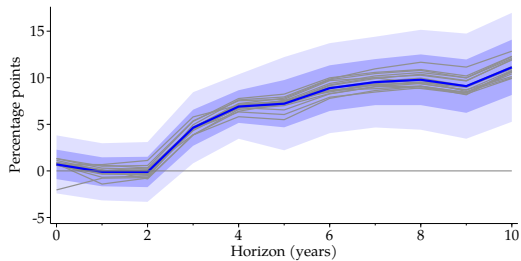
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Excluding one indicator / country at a time (hairplots)

Excluding one indicator at a time

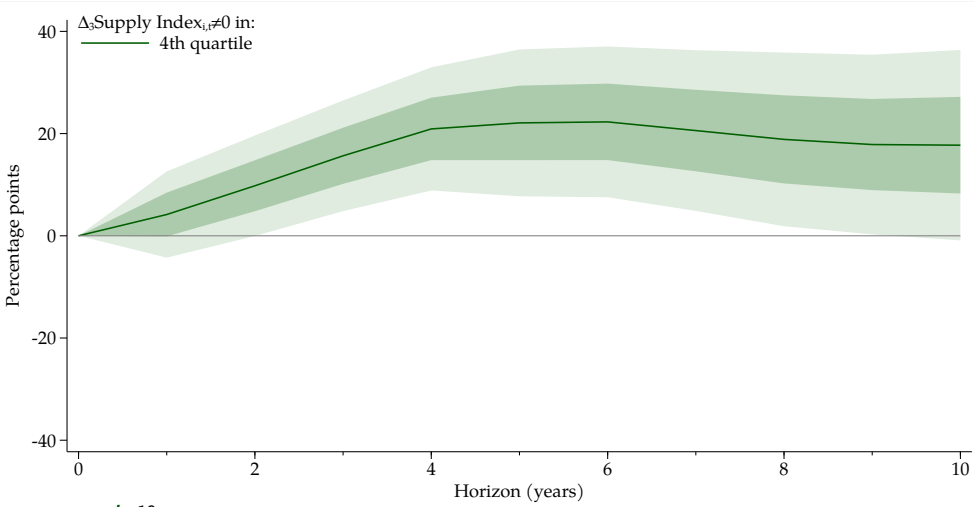


Excluding one country at a time



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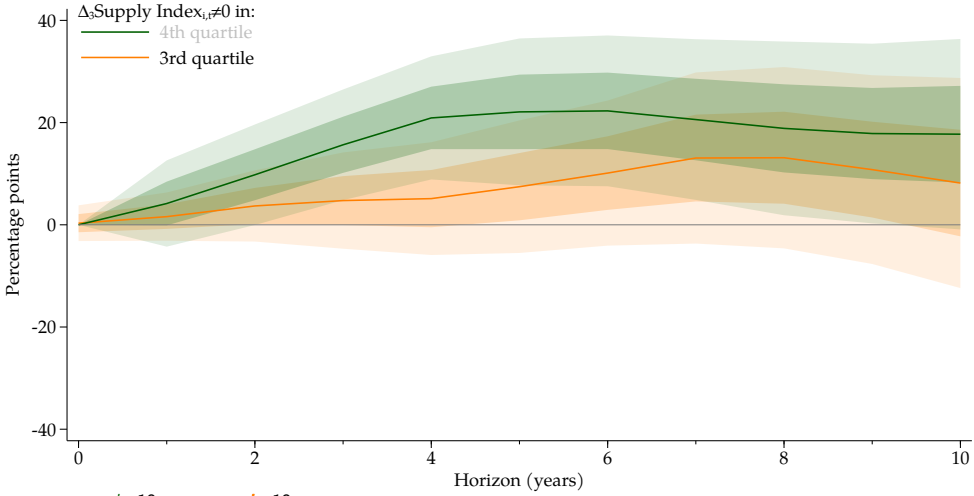
Quartile regressions



MLEs of $\{100\boldsymbol{\beta_4^h}\}_{h=0}^{10}$ as average marginal effects with 95% and 68% CIs of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \beta_1^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^1\} + \beta_2^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^2\} + \beta_3^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^3\} + \boldsymbol{\beta_4^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^4\}} + \sum_{k=0}^{5} \boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$.

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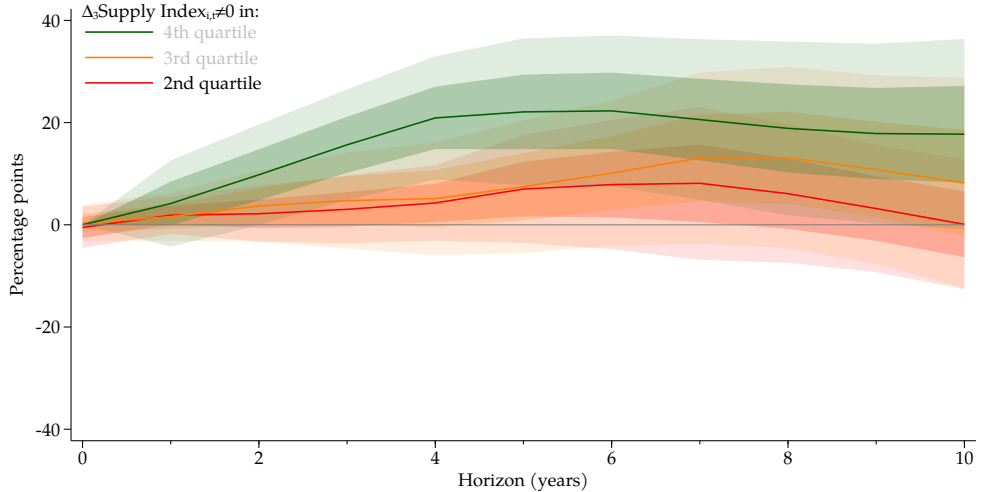
Quartile regressions



MLEs of $\{100\beta_4^h\}_{h=0}^{10}$, $\{100\beta_3^h\}_{h=0}^{10}$ as average marginal effects with 95% and 68% CIs of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \beta_1^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^1\} + \beta_2^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^2\} + \beta_3^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^3\} + \beta_4^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^4\} + \sum_{k=0}^{5} \boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$.

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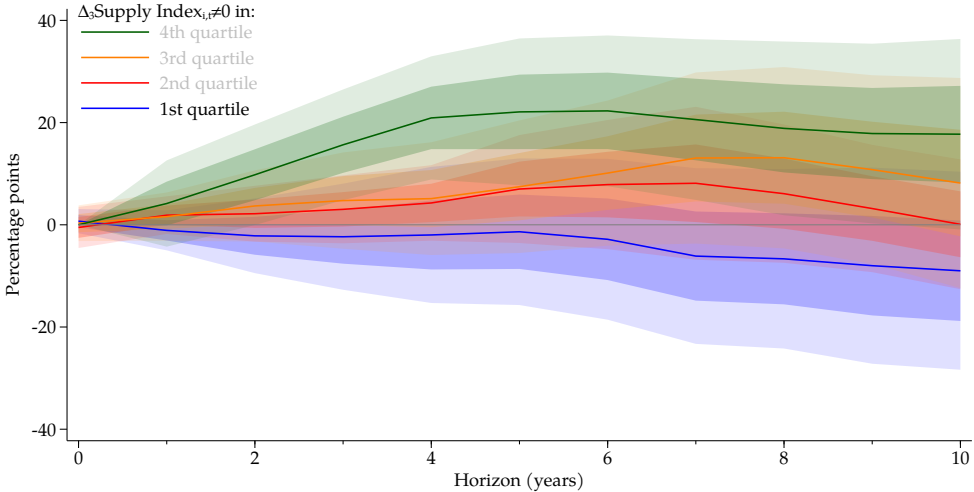
Quartile regressions



MLEs of $\{100\beta_4^h\}_{h=0}^{10}$, $\{100\beta_3^h\}_{h=0}^{10}$, $\{100\boldsymbol{\beta_2^h}\}_{h=0}^{10}$ as average marginal effects with 95% and 68% CIs of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \beta_1^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^1\} + \boldsymbol{\beta_2^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^2\}} + \beta_3^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^3\} + \beta_4^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^4\} + \sum_{k=0}^{5} \boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$.

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Quartile regressions

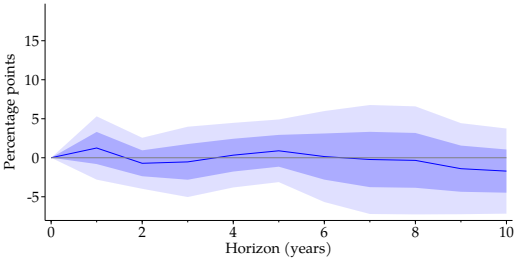


MLEs of $\{100\beta_4^h\}_{h=0}^{10}$, $\{100\beta_3^h\}_{h=0}^{10}$, $\{100\beta_2^h\}_{h=0}^{10}$, and $\{100\boldsymbol{\beta_1^h}\}_{h=0}^{10}$ as average marginal effects with 95% and 68% CIs of $\log\left(\frac{p_{i,t+h}}{1-p_{i,t+h}}\right) = \alpha_i^h + \boldsymbol{\beta_1^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^1\}} + \beta_2^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^2\} + \beta_3^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^3\} + \beta_4^h \mathbb{1}\{\Delta_3 Supply\ Index_{i,t} \in Q_i^4\} + \sum_{k=0}^{5} \boldsymbol{\Gamma}_k^h \boldsymbol{X}_{i,t-k} + u_{i,t+h}$.

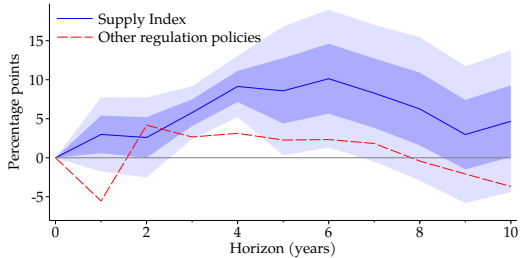
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The Abiad et al. (2010) index does not predict financial crises

Abiad et al. index



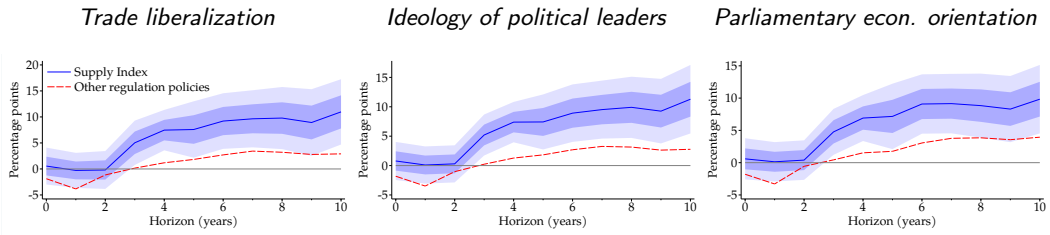
Supply Index using the Abiad et al. sample



Notes: In the left panel, we replace *Supply Index* with the Abiad et al. financial liberalization index. In the right panel, we use *Supply Index* but restrict the sample to those observations covered by the Abiad et al. index.

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Controlling for other policy dimensions

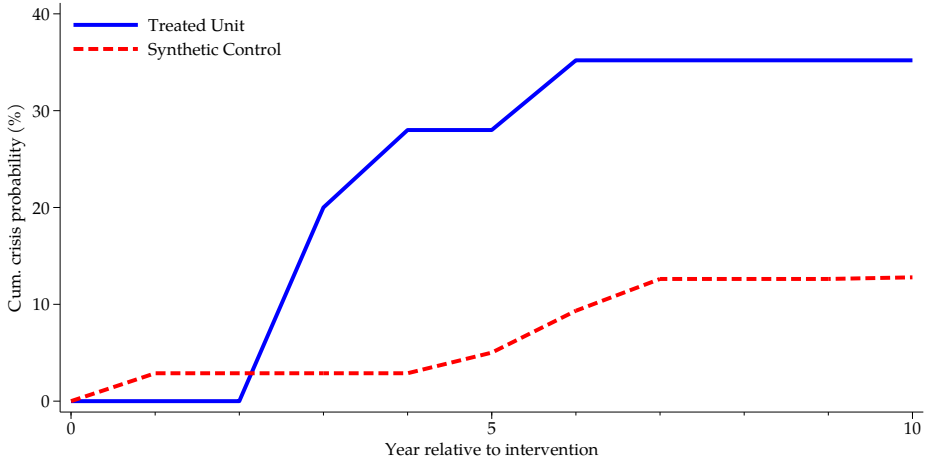


Notes: The same notes as in the main part apply with one modification; here, we additionally control for

- left panel: Wacziarg and Welch (2008) trade liberalization dates.
- center panel: two binary variables that capture the ideology of political leaders using the database constructed by Herre (2023).
- right panel: three variables that capture the relative emphasis placed on key economic policy dimensions in the manifestos of all parties represented in parliament in a given year, as coded in the Manifesto Project Dataset (Lehmann et al., 2025).

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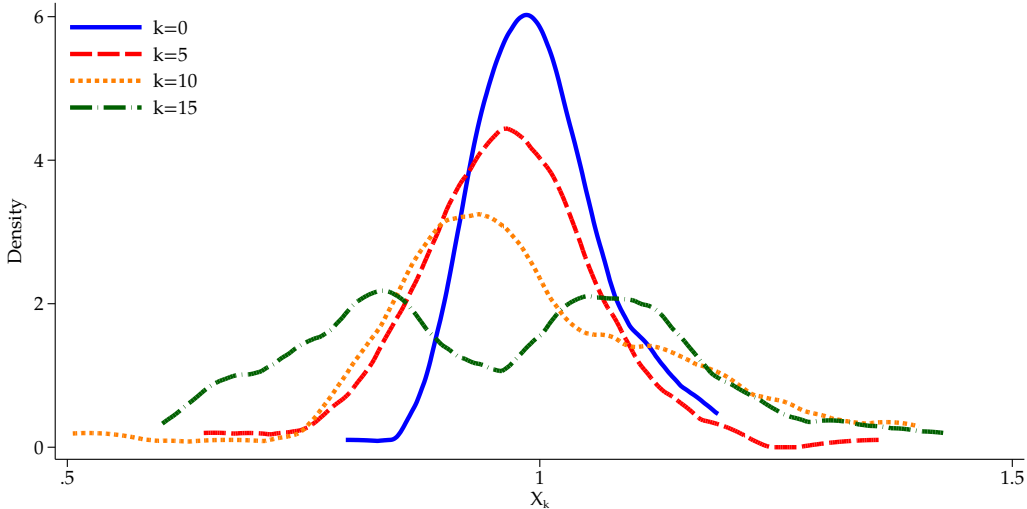
SCM estimates



Notes: The figure plots, at each post-intervention horizon h, the average treated unit and synthetic control probabilities of having entered a financial crisis since the intervention year, $1 - \prod_{k=0}^{h}(1 - \hat{\pi}^{r}_{t+k})$, where $\hat{\pi}^{r}_{t+k}$ is the estimated per-period crisis probability at horizon k under regime r.

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Loss distribution k years after a financial crisis



Notes: Empirical distribution of $\{X_{j,k}\}_{j=1}^{J_k}$ for different horizons k; $J_k = 82$ for $k \leq 12$ and 69 at $k = 15$.

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Welfare criterion and loss model

- Compare $V_r(\gamma) = \sum_{h=0}^{15} \beta^h E_t[u(c_{t+h})|r]$, $r \in \{\text{policy in } t, \text{no policy in } t\}$
  - CRRA period utility $u(c) = \frac{c^{1-\gamma}-1}{1-\gamma}$, risk aversion γ, discount factor $\beta = 0.96$
  - Policy in t: lifting a single credit-supply regulation (Δ Supply Index $= 1$)

- Expected consumption: $E_t[c_{t+h}|r] = S_h^r \, c_{t+h}^{\text{no crisis},r} + \sum_{k=0}^{h} f_k^r \, E_t[c_{t+h}^{\text{crisis}_{t+k},r}]$
  - f_k^r: prob. first crisis arrives at $t+k$; S_h^r: prob. of no crisis through $t+h$

- Cons. loss $h-k$ years after crisis: $c_{t+h}^{\text{crisis}_{t+k},r} = X_{h-k} c_{t+h}^{\text{no crisis},r}$, $\log X_k \overset{\text{iid}}{\sim} N(\mu_k, \sigma_k^2)$

- For each crisis j (82 since 1870), estimate $\{X_{j,k}\}_{k=0}^{15} \Rightarrow \{\hat{\mu}_k\}_{k=0}^{15}$ and $\{\hat{\sigma}_k^2\}_{k=0}^{15}$
  - $X_{j,k} = c_{j,k}^{\text{crisis}} / c_{j,k}^{\text{no crisis}}$; both paths $= 1$ in the year before crisis j
  - $c_{j,k}^{\text{no crisis}}$: avg. of countries without crisis within ± 15 years of crisis j

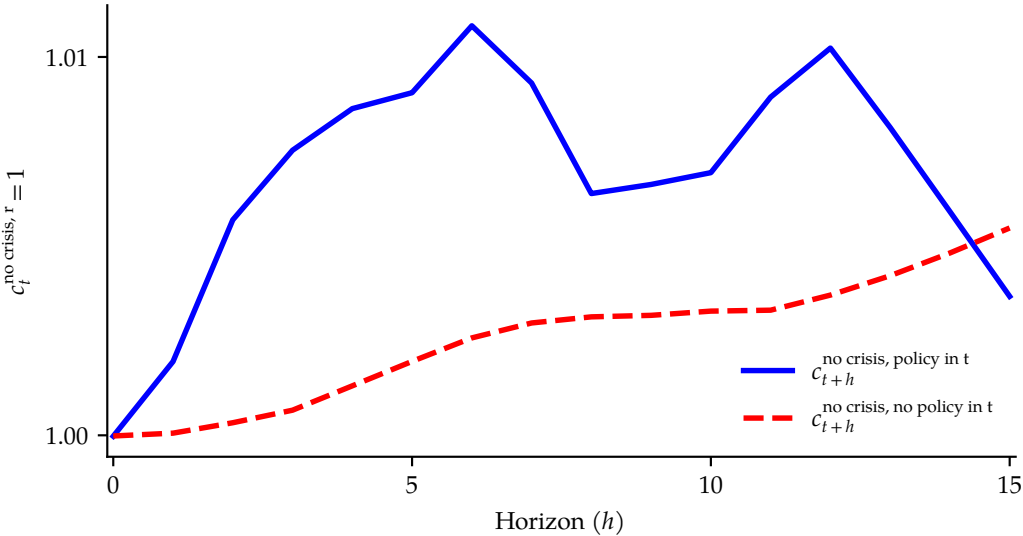
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Welfare estimation details

- $\hat{c}^{r}_{t+h}$, $h = 0, \ldots, 15$, used for *average* paths $E_t[c_{t+h}|r]$
  - $\hat{c}^{\text{no policy in } t}_{t+h} = 1$; $\hat{c}^{\text{policy in } t}_{t+h}$ from LP estimates
- Hazard rates $\pi^{r}_{t+h} = \text{Prob}(\text{crisis}_{t+h} \mid \text{no crisis before } t+h,\ r)$
  - $\hat{\pi}^{\text{no policy in } t}_{t+h}$: postwar annual crisis frequency; $\hat{\pi}^{\text{policy in } t}_{t+h}$ from logit estimates
- Define $\hat{f}^{r}_{k} = \hat{\pi}^{r}_{t+k} \prod_{\ell=0}^{k-1}(1 - \hat{\pi}^{r}_{t+\ell})$, $\hat{S}^{r}_{h} = \prod_{\ell=0}^{h}(1 - \hat{\pi}^{r}_{t+\ell})$
- Unobservable no-crisis consumption: $c^{\text{no crisis},r}_{t+h} = \dfrac{\hat{c}^{r}_{t+h}}{\hat{S}^{r}_{h} + \sum_{k=0}^{h} \hat{f}^{r}_{k}\, e^{\hat{\mu}_{h-k} + \frac{1}{2}\hat{\sigma}^{2}_{h-k}}}$
- Post-crisis period utility: $E_t[u(c^{\text{crisis}_{t+k},r}_{t+h})] = \dfrac{(c^{\text{no crisis},r}_{t+h})^{1-\gamma} e^{(1-\gamma)\hat{\mu}_{h-k} + \frac{1}{2}(1-\gamma)^2\hat{\sigma}^{2}_{h-k}} - 1}{1-\gamma}$
- Expected utility: $E_t[u(c_{t+h})|r] = \hat{S}^{r}_{h}\, u(c^{\text{no crisis},r}_{t+h}) + \sum_{k=0}^{h} \hat{f}^{r}_{k}\, E_t[u(c^{\text{crisis}_{t+k},r}_{t+h})]$

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No-crisis counterfactual consumption paths



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