

Costs of Regional Financial Crises in the US

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Introduction

Q. What is the impact of a banking crisis?

Cross country studies: systemic banking crises are linked to deep, prolonged recessions
(e.g., Reinhart and Rogoff, 2009; Hall, 2010; Schularick and Taylor, 2012; Romer and Romer, 2017)

We study banking crises from a US regional perspective:

- *New data:* harmonized state-level banking statistics (1863-2023) and state economic activity index.
- *Result 1:* US financial crises followed by deep and uneven state-level recessions.
- *Result 2:* Regional crises are also costly, independent of systemic crises.
- *Result 3:* Propagation of state crises correlates with connections across financial sector.

Related literature

Cross-country literature on financial crises

Bordo (1985); Bordo et al. (2001); Cerra and Saxena (2008); Reinhart and Rogoff (2009); Schularick and Taylor (2012); Laeven and Valencia (2013, 2020); Romer and Romer (2017); Sufi and Taylor (2022); Greenwood et al. (2022); Frydman and Xu (2023)

→ **Contribution:** Within-country variation, local crises = more power, can control for common shocks

Episodic evidence on (U.S.) financial crises

Sprague (1910); Kemmerer (1910); Juglar (1916); Friedman and Schwartz (1963); Bernanke (1983); White (1983); Delong and Summers (1986); Gorton (1988); Sobel (1988); Calomiris and Gorton (1991); Wicker (1996, 2000, 2006); Peek and Rosenberg (2000); Calomiris and Mason (2003a, 2003b); Ashcraft (2005); Carlson and Mitchener (2009); Giesecke et al. (2014); Davison and Ramirez (2014); Jalil (2015); Rajan and Ramcharan (2015); Bordo and Haubrich (2017); Huber (2018); Jaremski and Wheelock (2020, 2024); Cohen et al. (2021); Carlson et al. (2022)

→ **Contribution:** First systematic study of output losses following U.S. crises using 160 years of data

Measurement of crises and financial stress

Bordo and Meissner (2016); Baron, Verner, and Xiong (2021); Ahir et al. (2023); Jamilov, König, Müller, and Saidi (2024); Krishnamurthy and Muir (2025)

→ **Contribution:** Regional financial crises contain independent information about macroeconomy

Roadmap

1 A Historical State-Level Macro-Financial Dataset, 1863-2023

2 The Output Losses of U.S. Financial Crises

3 The Aftermath of Regional Crises

4 Propagation of Crises

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Banking data, 1863-1960

Digitized the Officer of the Comptroller of the Currency's (OCC) Annual Reports

- From 1863: covers all nationally-chartered banks,
- From 1890: adds state-chartered banks (not comprehensive)
- Extends Carlson, Correia, and Luck (CCL, 2022) data on the state-level (**1863-1960** vs. 1867-1904)

IOWA.				
	45 banks.	44 banks.	45 banks.	45 banks.
Loans and discounts	\$4,704,243 03	\$5,083,156 28	\$4,915,312 64	\$5,249,256 22
U. S. bonds dep'd to secure circulation ...	3,682,150 00	3,682,150 00	3,712,150 00	3,713,150 00
U. S. bonds dep'd to secure deposits	583,250 00	575,150 00	504,000 00	429,000 00
U. S. bonds and securities on hand	306,350 00	286,250 00	388,900 00	299,600 00
Other stocks, bonds, and mortgages	131,427 82	151,143 69	146,023 00	125,811 71
Due from national banks	1,102,101 39	1,070,215 96	808,189 25	1,106,505 23
Due from other banks and bankers	273,729 72	224,904 00	154,385 35	145,967 58
Real estate, furniture, &c	187,185 55	206,550 60	225,254 68	246,210 96
Current expenses	49,387 07	73,407 89	37,852 46	86,132 43
Premiums	21,406 63	21,005 99	17,575 46	15,901 66
Checks and other cash items	181,190 92	137,842 02	151,279 23	152,678 82
Bills of national banks	215,936 00	201,865 00	216,626 00	255,920 00
Bills of other banks	16,983 00	9,637 00	6,239 00	6,212 00
Specie	55,542 98	47,429 07	43,364 02	29,730 22
Legal tender notes and fract'l currency ..	1,388,452 06	1,305,581 77	1,266,545 69	1,235,122 99
Compound interest notes	676,000 00	714,550 00	639,950 00	335,440 00
Total	13,585,336 17	13,790,839 27	13,243,656 78	13,522,739 82

MINNESOTA.				
Resources.	* JANUARY.	APRIL.	JULY.	OCTOBER.
	15 banks.	15 banks.	15 banks.	15 banks.
Loans and discounts	\$2,095,713 77	\$1,993,778 31	\$2,082,646 26	\$2,080,034 77
U. S. bonds dep'd to secure circulation ...	1,682,200 00	1,682,200 00	1,682,200 00	1,682,200 00
U. S. bonds dep'd to secure deposits	109,550 00	100,000 00	102,250 00	100,000 00
U. S. bonds and securities on hand	106,900 00	110,650 00	136,250 00	90,950 00
Other stocks, bonds, and mortgages	63,257 48	67,439 79	76,725 21	65,440 55
Due from national banks	241,440 33	301,547 26	231,625 07	437,946 07
Due from other banks and bankers	112,576 12	67,379 80	81,180 32	83,317 37
Real estate, furniture, &c	70,565 59	73,619 54	76,683 81	84,714 73
Current expenses	11,010 02	22,352 88	17,618 37	42,392 74
Premiums	22,040 93	19,888 26	18,743 16	10,048 76
Checks and other cash items	130,260 27	72,716 97	150,729 76	144,249 66
Bills of national banks	31,065 00	21,540 00	27,393 00	81,025 00
Bills of other banks	8,229 00	4,622 00	3,399 00	1,993 00
Specie	10,446 71	13,367 35	20,868 02	6,204 69
Legal tender notes and fract'l currency ..	285,580 69	218,160 72	293,901 38	395,348 26
Compound interest notes	328,450 00	267,530 00	292,500 00	159,650 00
Total	5,309,585 91	5,006,792 88	5,294,778 36	5,465,515 60

Failures: CCL for 1863-1904, Huntoon/Van Belkum (1968) for 1905-16, OCC for 1917-41, FDIC for 1942-2021

Banking data, 1960-2023

Principal data source: FDIC

- Bank failures (1942-2023)
- Bank Find Suite state-level aggregates (1960-1980), Call Reports (1981-2023)

Challenge: post-1980 interstate branching renders state-level aggregates unusable

- FDIC aggregates and Call Reports assign entire balance sheets to headquarter state
- But after branching liberalization, especially after IBBEA of 1994, banks operate across many states

Solution: Reweight bank-level data by state deposit shares

- Use FDIC Summary of Deposits (deposits by bank, **county**, year), 1981-2023 (FOIA request)
- Example: 50% deposits in Maine → assign 50% of total bank assets to Maine

New state-level data on economic outcomes

Introduced in companion paper (Hoon, Liu, Müller, and Zheng, 2025)

- Newly digitized annual dataset: 62 variables, 48 states, 1870-2021
- Based on digitizing, integrating, and harmonizing 135 sources

Key variable: Estimated index of state-level economic activity covering 1871-2021

- Estimated using dynamic factor model with 23 inputs
- Extends state-level output data by ~90 years (BEA's GDP data starts in 1963)

	Variable	Frequency	Coverage
This paper	Economic activity index	Annually	1871–2021
BEA	Personal income	Annually	1929–2024
BEA	GDP	Annually	1963–2024
Crone and Clayton-Matthews (2005)	Coincident index	Monthly	1978–2003
Baumeister, Leiva-León and Sims (2024)	Economic conditions index	Weekly	1987–2023

A census of U.S. financial crisis chronologies

We survey 25 existing crisis chronologies

- From Sprague (1910) to Jamilov, König, Müller, and Saidi (2024)
- Include both U.S.-specific and cross-country crisis lists

Key takeaways

- Broad agreement on major crises
- Disagreement for many other years

Our survey yields two lists we will use throughout the paper

- **Benchmark systemic crises**: with majority agreement (1873, 1884, 1893, 1907, 1930, 1982, 2007)
For the 1980s, we use 1982 following Lopez-Salido and Nelson (2010)
- **Potential crises**: 89 years flagged as crisis by at least one chronology (~every third year)

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Estimating the output losses of U.S. financial crises

We estimate panel local projections à la Jordà (2005) in a state (i)-year (t) panel:

$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h \quad \text{with } h \in [0,5]$$

Estimating the output losses of U.S. financial crises

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Change in log real economic activity relative to t-1

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↑ Dummy for a U.S.-wide systemic crisis

↑

Change in log real economic activity relative to t-1

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Five lags of $\Delta Y_{i,t}$ (additional controls for robustness)

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Change in log real economic activity relative to t-1

Five lags of $\Delta Y_{i,t}$ (additional controls for robustness)

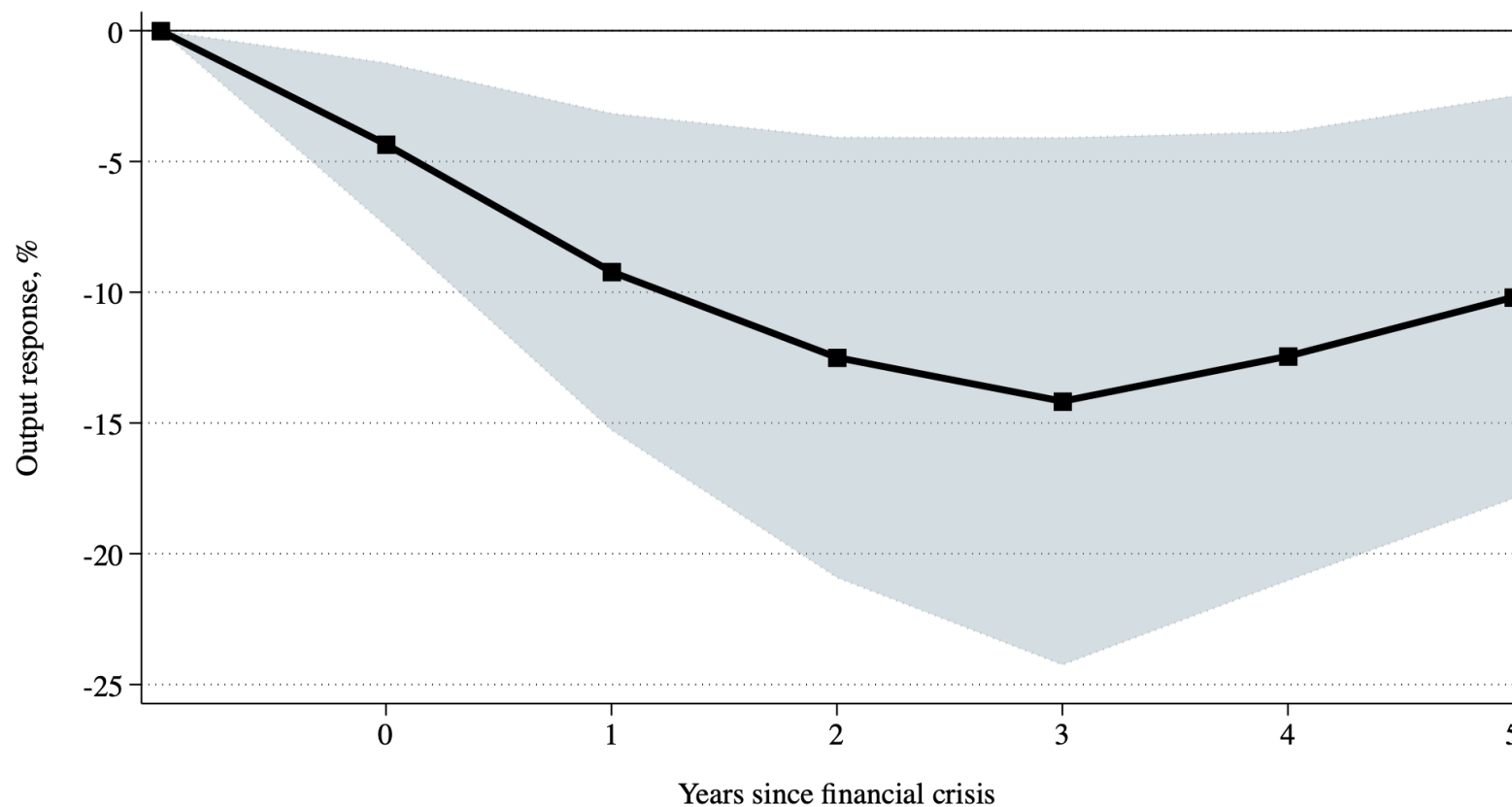
We consider a forecast horizon h up to 5 years. Standard errors are clustered by state and year.

Major caveats: banking crises are different, institutions have changed, Depression is an outlier, no instrument, state-level economic activity is not the same as GDP.

Banking crises predict long-lasting output losses

Impact of a US wide banking crisis on state activity, based on 150 years of data

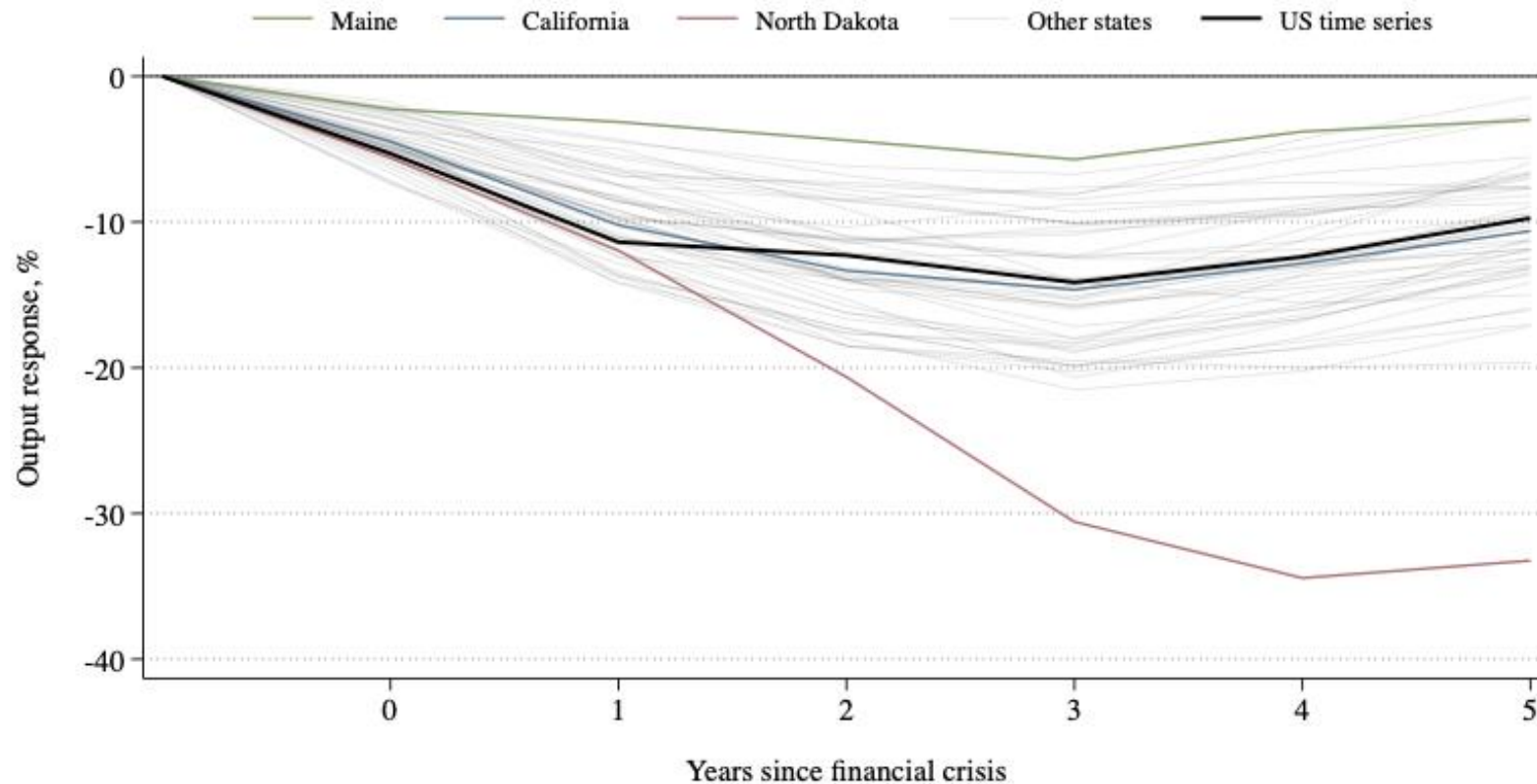
$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



Heterogeneous output responses across states

Range of -34 and -1% across states

$$\Delta Y_{t+h}^s = \alpha^{s,h} + \beta^{s,h} \mathbf{1}_t^{U.S. crisis} + \sum_{k=1}^5 \gamma^{s,k,h} \Delta \mathbf{X}_{t-k}^s + \varepsilon_t^{s,h}$$



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From nationwide to regional banking crises

Why should we care about regional banking distress?

- Few major systemic crises mean limited statistical power
- Considerable heterogeneity in average output losses across states
- Heterogeneity matters for policy decisions

We incorporate statistical data to identify **regional crises** based on:

- Deposit growth
- Wholesale liability growth (defined as in Acharya and Mora, 2015)
- Bank failures

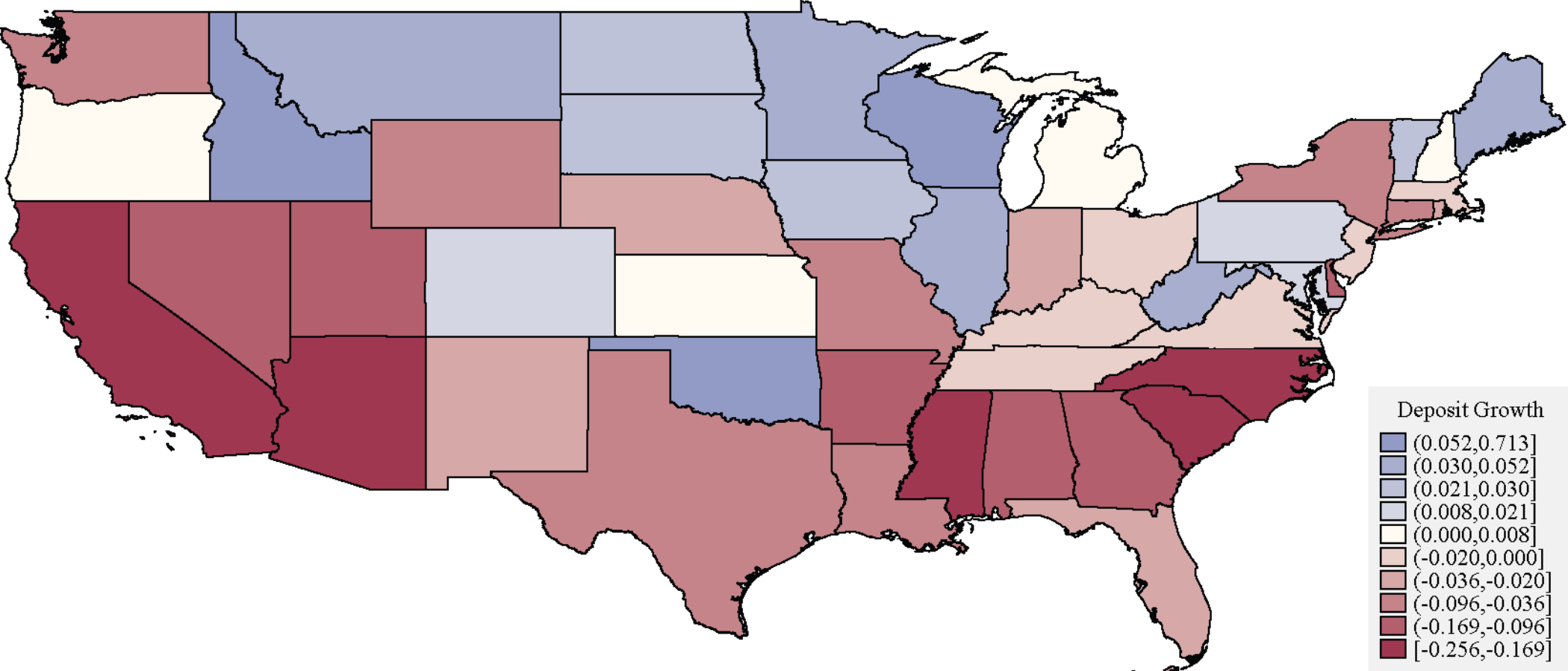
Key idea: combine statistical and narrative evidence

- Blend state-level **statistical** indicators with U.S.-wide **narrative** indicator for “potential” crises
- Conceptually similar to Baron, Verner, and Xiong (2021) and Jamilov, König, Müller, and Saidi (2024)

Banking sector distress during crises varies widely

Panic of 1893

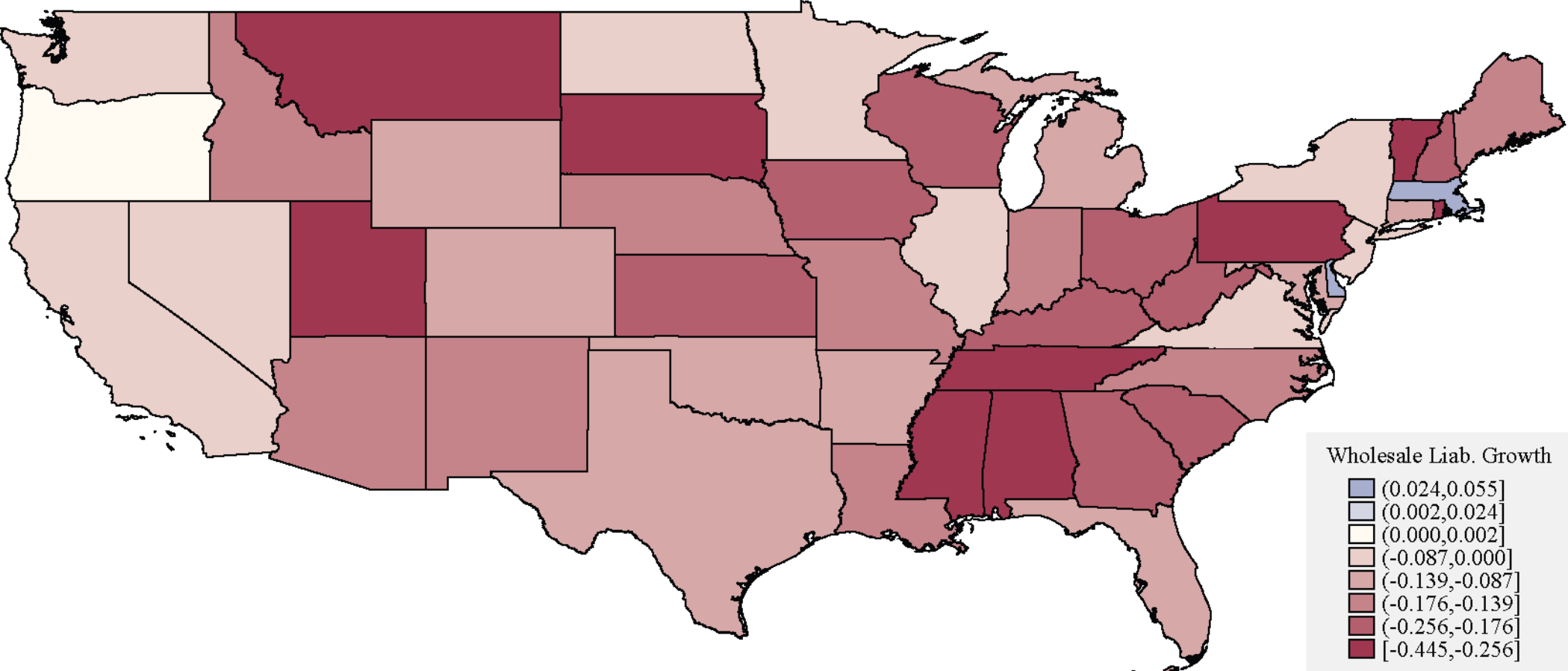
Deposit growth rate



Banking sector distress during crises varies widely

Global Financial Crisis of 2007

Wholesale funding growth rate



Defining regional financial crises

Regional crisis = 1 if both conditions are met:

- 1. Narrative evidence** (in year t)
Crisis year flagged in any existing chronology (list of 89 “potential crises”)
- 2. State-level statistical evidence** (in year t and state i)
 - a) Negative YoY growth in deposits or wholesale liabilities within one year, and
 - b) At least one bank failure within one year.

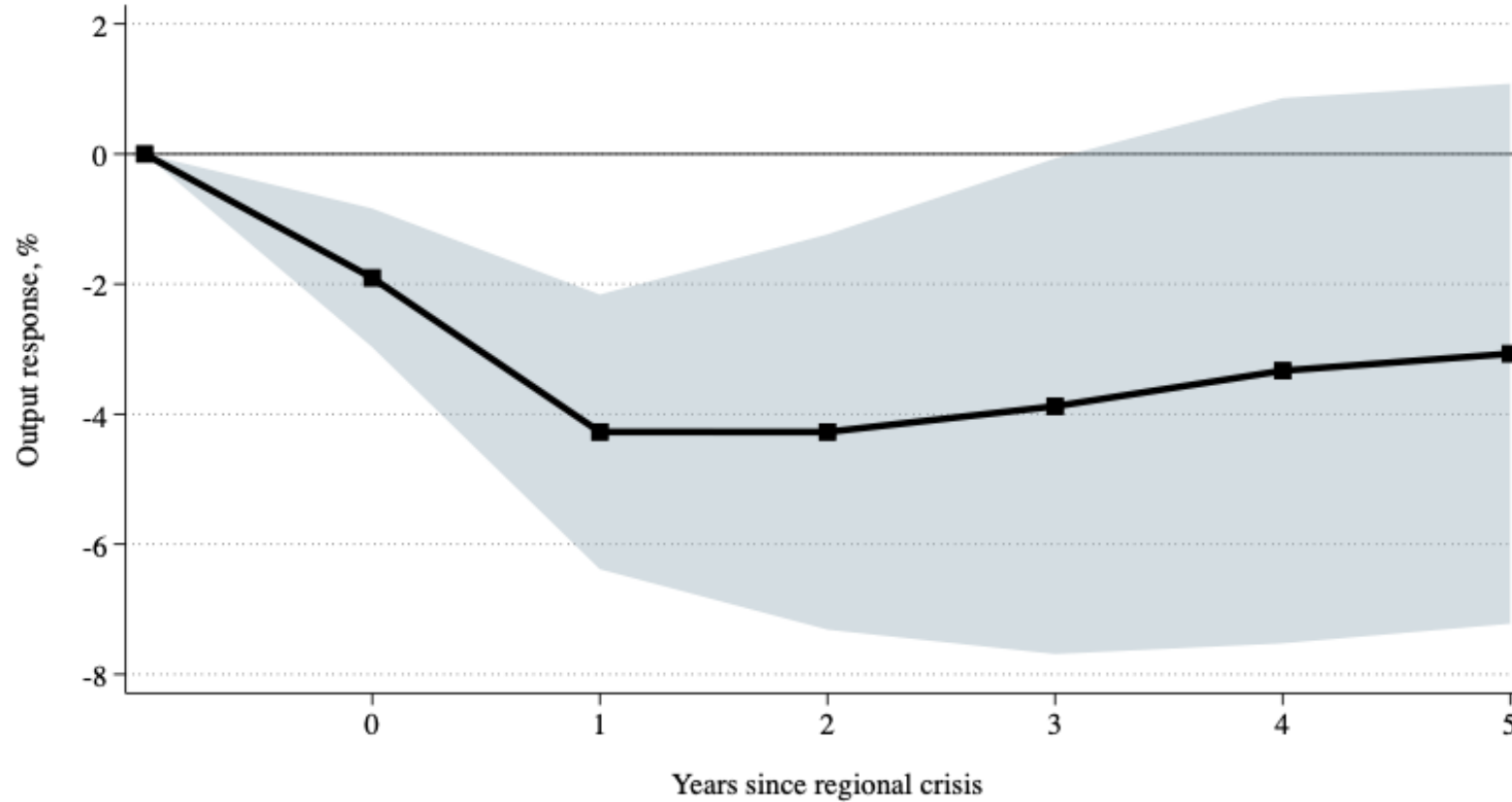
Result: new state-level chronology

- 1565 episodes
- Vastly more than the number of financial crises in cross-country data

(We vary the precise definitions for robustness.)

Regional crises predict output losses of 4%

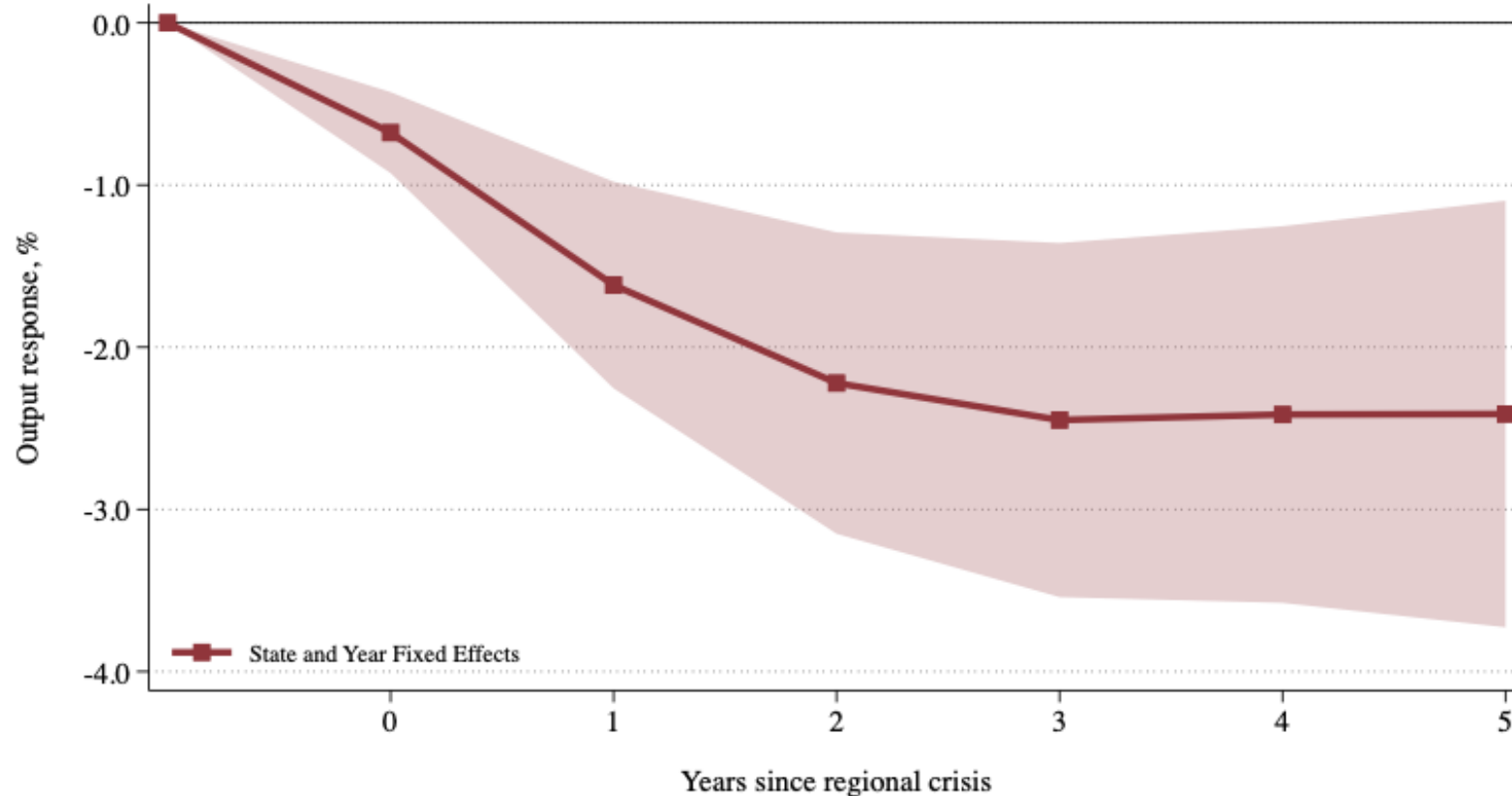
$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \mathbf{1}_{it}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



Output losses of 2.4% even with time fixed effects

Different from cross-country literature, absorbs common shocks (e.g., monetary policy)

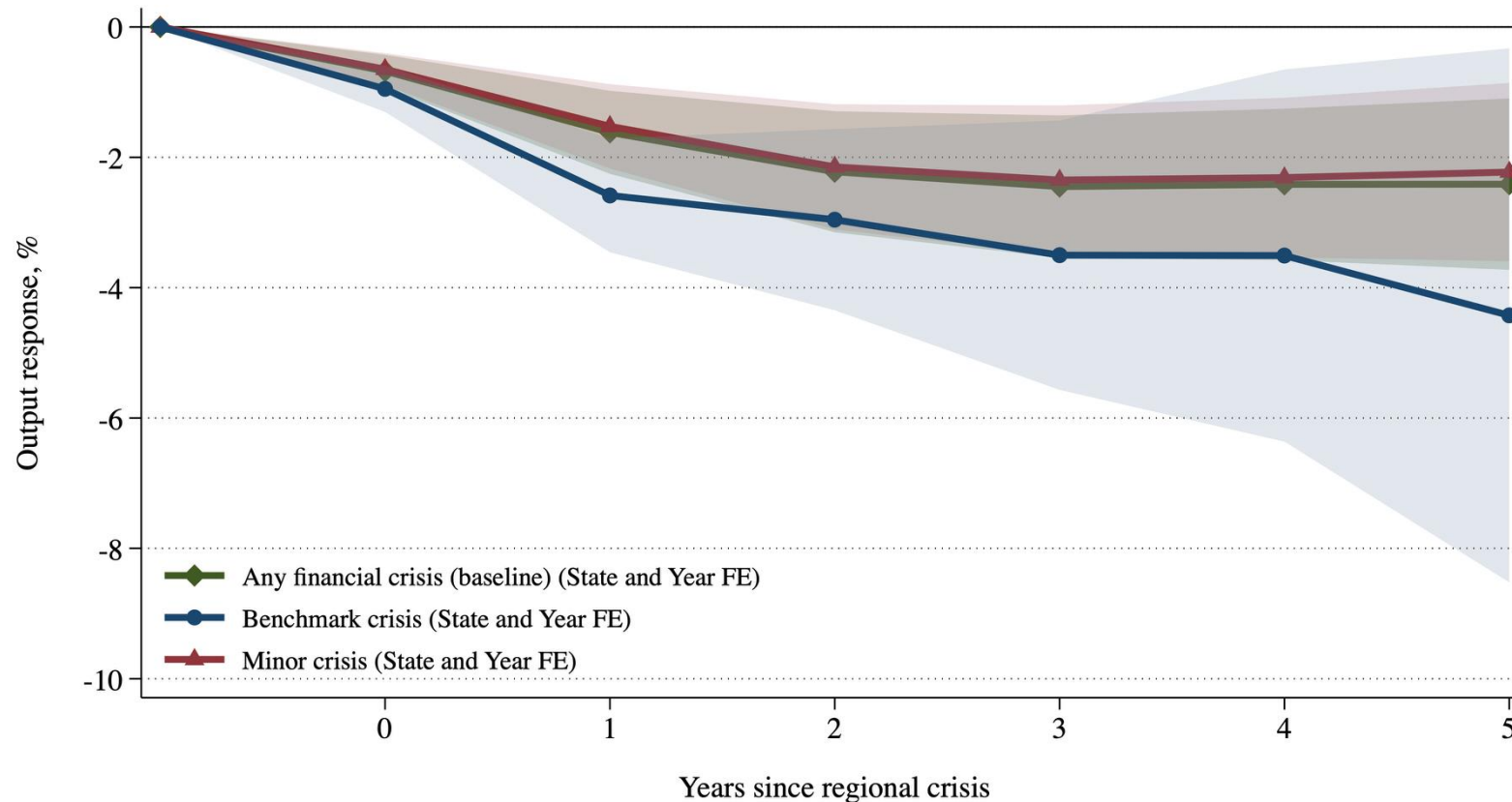
$$\Delta Y_{i,t+h} = \alpha_i^h + \alpha_t^h + \beta^h \mathbf{1}_{it}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



Regional banking distress outside of systemic crises

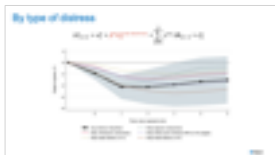
Output losses of 2.4% when distress occurs in years other than major systemic crises

$$\Delta Y_{i,t+h} = \alpha_i^h + \alpha_t^h + \beta^h \mathbf{1}_{i,t}^{\text{Regional crisis}} + \sum_{k=0}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



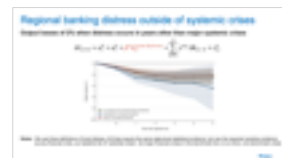
Notes: We use three definitions of local distress. All three require the same state-level statistical evidence, but vary the required narrative evidence: (a) any financial crisis, our baseline list of “potential crises”, (b) systemic financial crises, or (c) minor, non-systemic crises.

Additional results and robustness



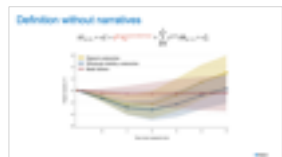
Types of regional financial crises

- Runs (deposits, wholesale) vs. failures



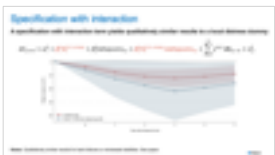
Types of U.S. wide crises

- Regional banking distress in vs. out of U.S. systemic crises



Ignore narrative chronologies

- Only use statistical markers



Continuous variation

- Interaction of nationwide narrative crises with state-level statistical indicators



Alternative definitions

- Changing nature of crises (pre/post FDIC)
- Different horizons: Exact year of U.S.-wide crisis, ± 1 or ± 2 years
- Incorporate state banks and savings institutions

Recap

Regional variation is important for understanding financial crises

- Substantial state-level heterogeneity in bank liability growth and failures
- We condense this information into indicators of regional financial crises

Regional crises matter for local economies

- Far more frequent than nationwide systemic crises
- Associated with smaller but nontrivial output declines

Open question: do regional crises also matter for the U.S. economy as a whole?

- Not obvious because regional shocks may wash out in the aggregate

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Cross State Interactions

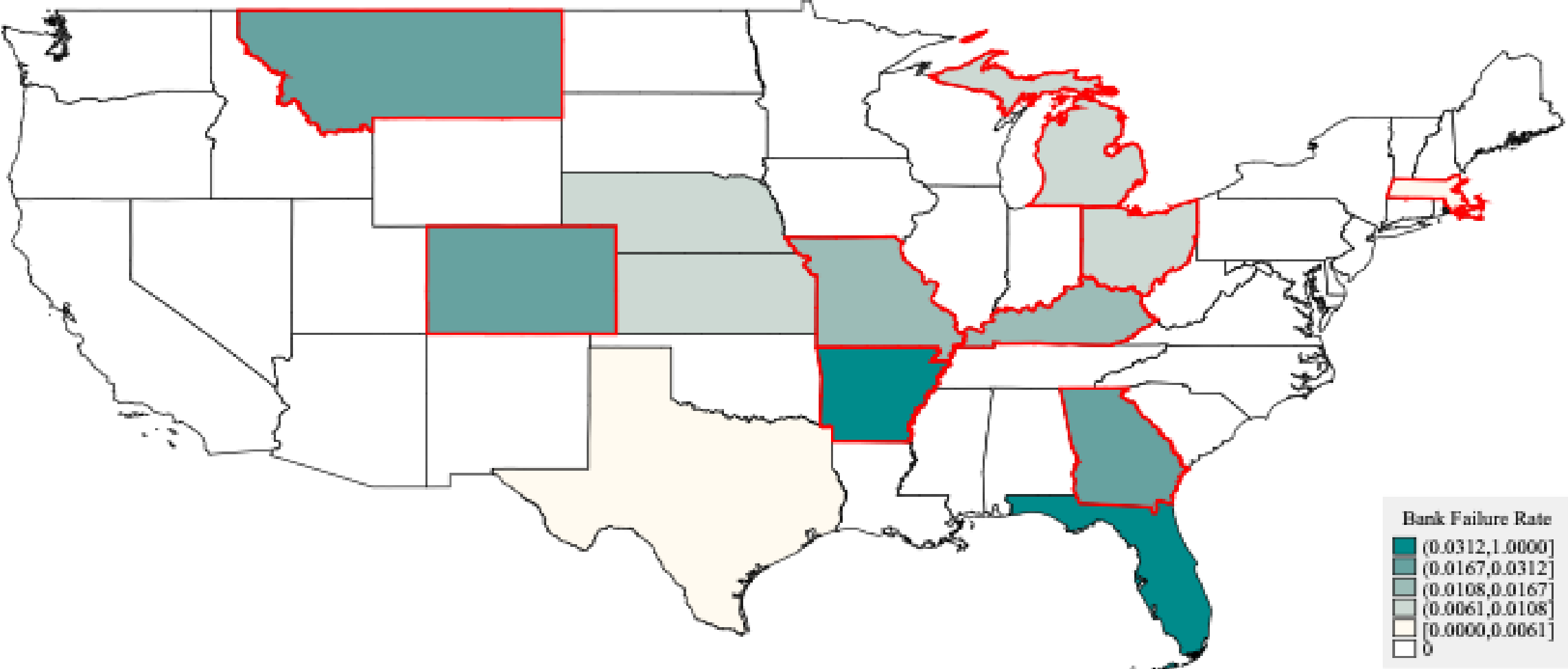
Recent interest in spatial banking models

We can study crisis correlation and propagation:

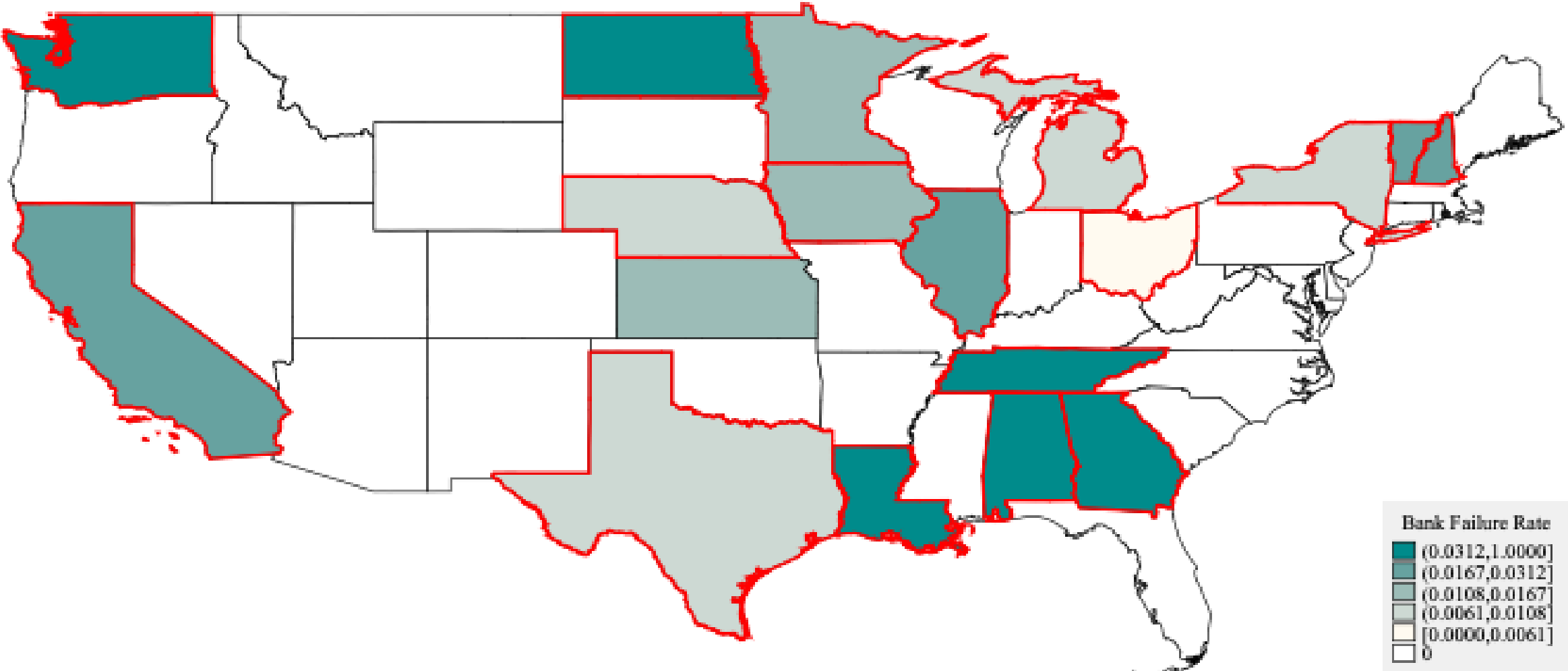
- Spread of bank failures
- Spread of output losses following a bank failure

Allows us to document financial-output contagion at the state level

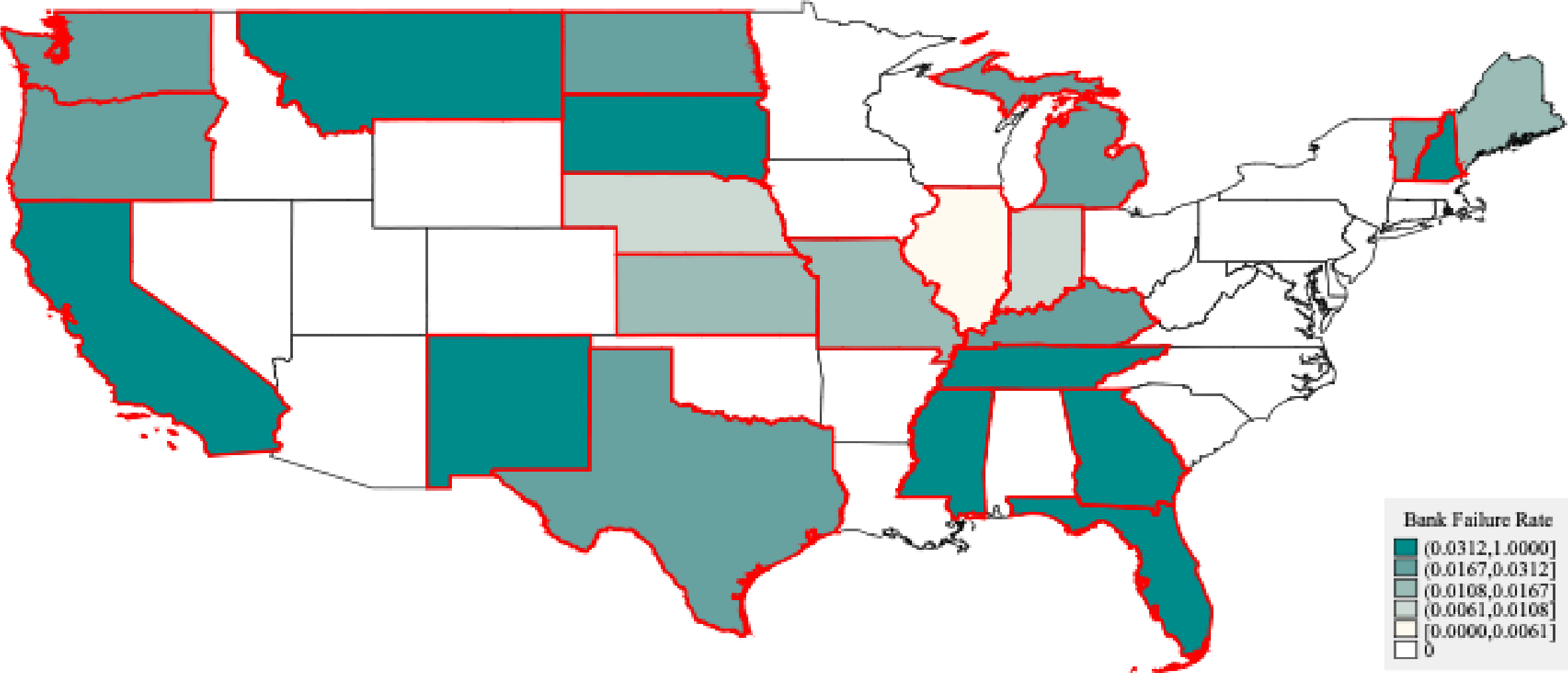
Crisis Contagion in 1893: 1893Q1



Crisis Contagion in 1893: 1893Q2



Crisis Contagion in 1893: 1893Q3

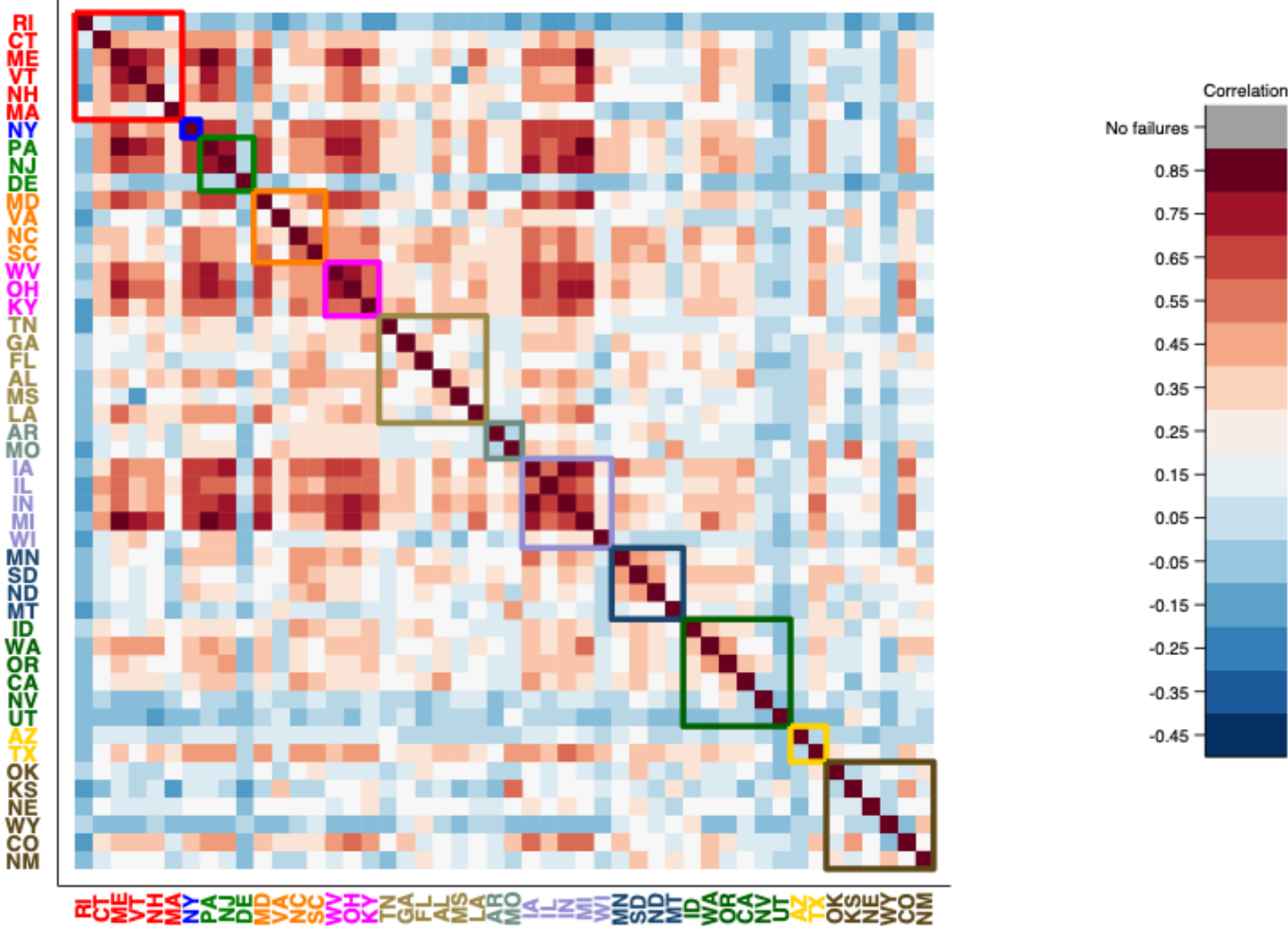


Bank Failure Rate Correlations (1870-1945)

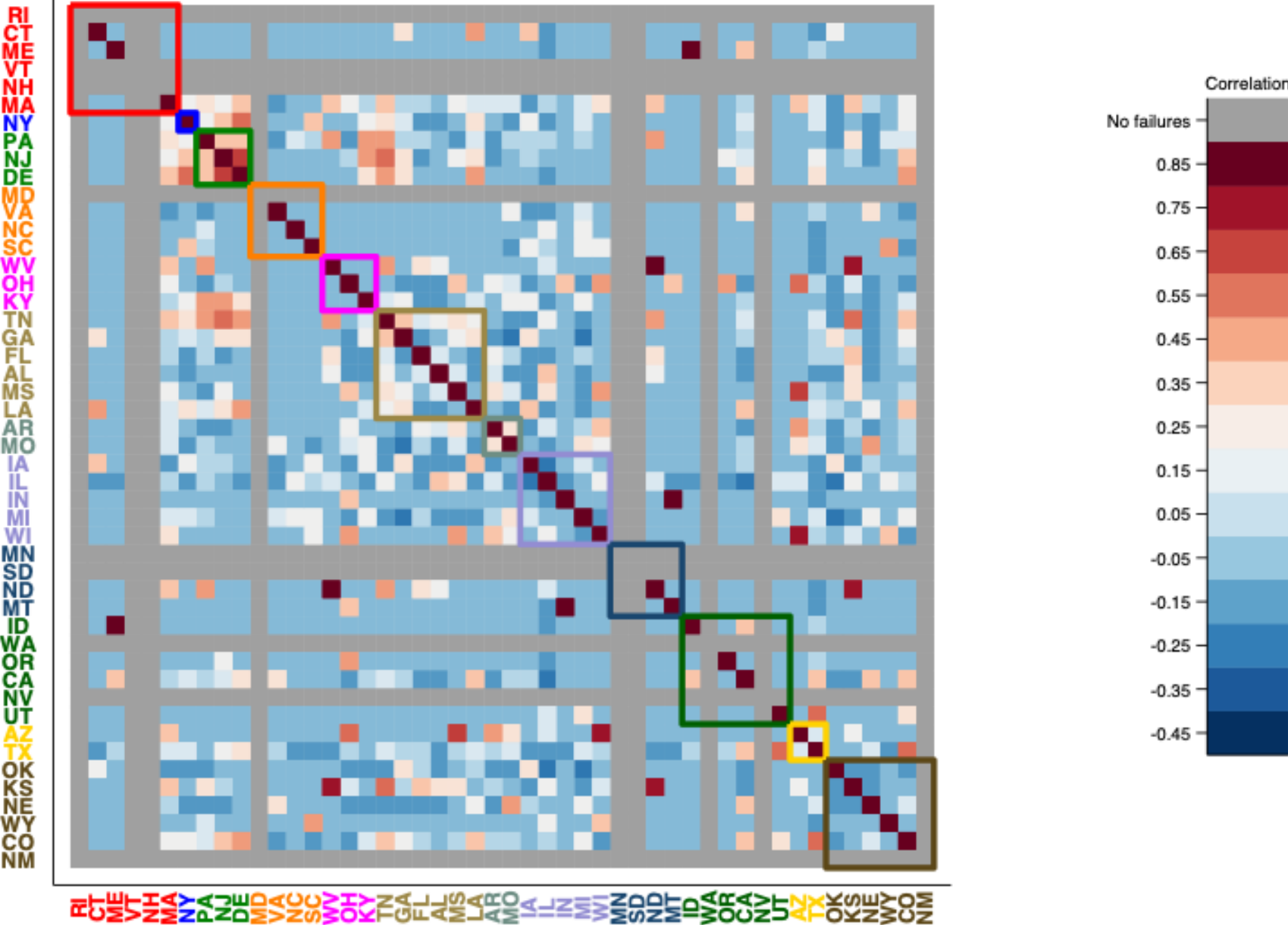
States grouped by reserve banking region

High correlation between bank failures in North East and Mid West

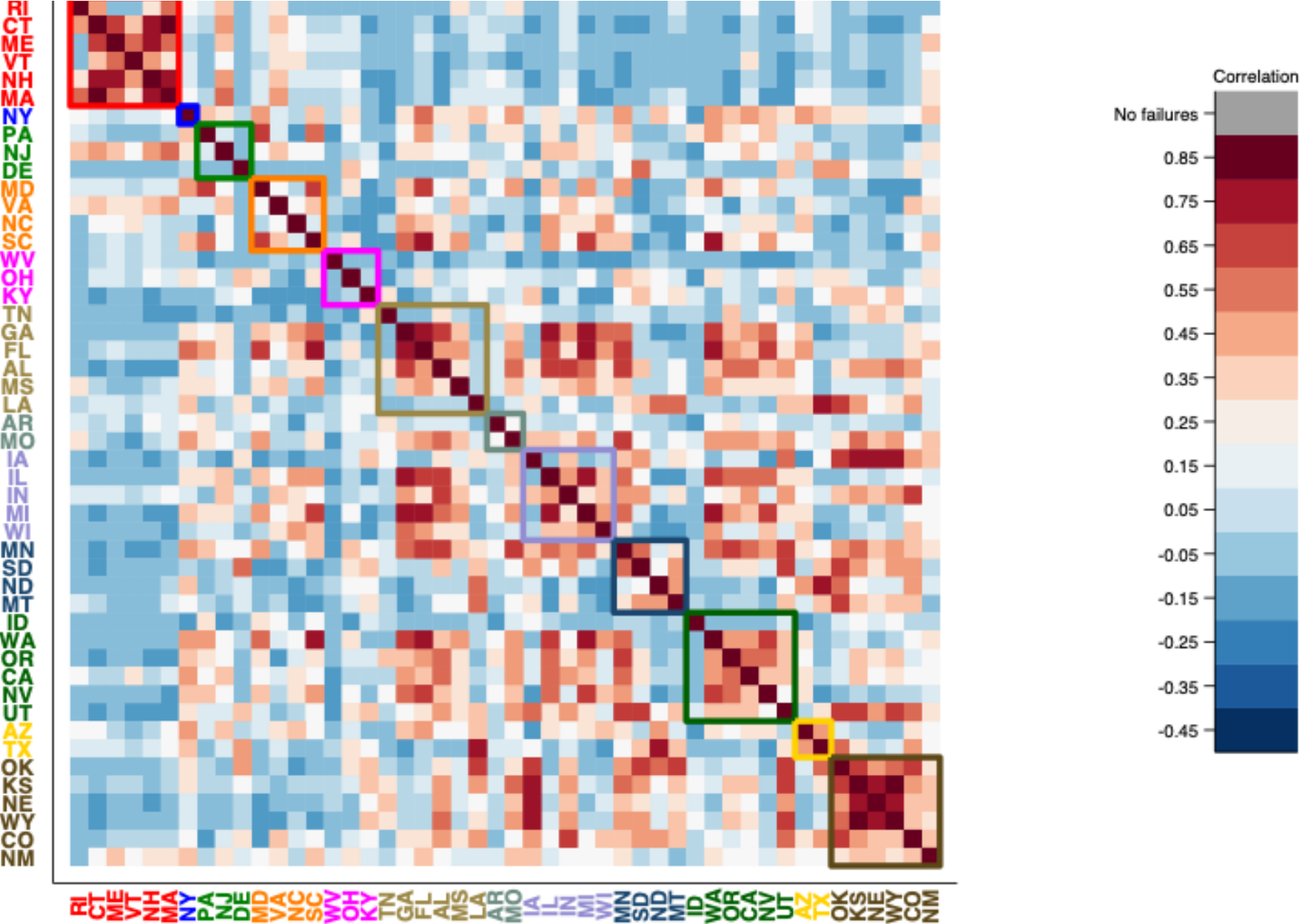
West largely disconnected.



Bank Failure Rate Correlations (1946-1980)



Bank Failure Rate Correlations (1981-2023)



Conclusion

Backbone: new historical macro-financial data for U.S. states, 1863-2023

- Harmonized banking data from OCC reports and adjusted FDIC aggregates
- New estimates of economic activity (Hoon, Liu, Müller, and Zheng, 2025)
- Coupled with a survey of U.S. crisis chronologies

We propose a regional perspective for studying financial crises

- Regional crises far more common than country-wide events
- They predict output losses of 4%, around half of systemic national crises
- The share of states in distress signals lower future U.S. output

Takeaway: Financial crises have an important regional dimension hidden by national aggregates

- Have the costs of crises been underestimated? Are there new patterns?



Supplementary slides

Crisis Chronology



A census of U.S. financial crisis chronologies

We survey 25 existing crisis chronologies

- From Sprague (1910) to Jamilov, König, Müller, and Saidi (2024)
- Include both U.S.-specific and cross-country crisis lists

Key takeaways

- Broad agreement on a few major crises
- Substantial disagreement for many other years

Our survey yields two lists we will use throughout the paper

- **Systemic crises**: 10 years with $\geq 50\%$ agreement (7 crises after 1870)
For the 1980s, we use 1982 following Lopez-Salido and Nelson (2010)
- **Potential crises**: 89 years flagged as crisis by at least one chronology (~every third year)

Surveying 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W	
1791		—		—		—								—				Yes		—				—		
1792		—		—		—								—				Yes		—		Yes			—	
1797		Yes		Yes		—								—				—		—		—		Yes		
1809		—		Yes*		—					—			—				—		—		—		—		
1814		—		—	Yes	—						Yes		Yes				Yes	Yes	—		—		—		
1815		—		Yes	O	—						—		—				—	—	—		—		Yes		
1816		—		—	O	—						—		—				—	—	—		—		—		
1817		—		—	O	—						—		—				—	Yes	—		—		—		
1818		—		—	—	—						—		Yes				Yes	O	—		—		—		
1819		Yes		Yes*	Yes	—						Yes		—				—	O	Yes	Yes	—		—		
1820		—		—	—	—						—		—				Yes	—	—	—	—		—		
1825		—		Yes*	—	—					—	—		Yes				—	Yes	—	—	—		Yes		
1826		—		—	—	—					—	—		O				—	—	—	—	—		—		
1829		—		—	—	—					—	—		—				Yes	—	—	—	—		—		
1831		—		—	—	—					—	—		Yes				—	—	—	—	—		—		
1833		—		Yes*	—	—					Yes	—		—				Yes	—	—	—	—		Yes		
1834		—		—	—	—					O	—		—				—	—	—	—	—		—		
1837		Yes		Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
1838		—		—	—	—					—	—		O				—	O	—	—	—		—		
1839		—		Yes	Yes	—					Yes	—		O				Yes	—	—	Yes	—		Yes		
1840		—		—	O	—					—	—		—				—	—	—	—	—		—		
1841		—		—	O	—					Yes*	Yes		—				—	Yes	—	—	—		—		
1842		—		—	O	—					Yes*	—		—				—	—	—	—	—		—		
1847		—		Yes	—	—					—	—		—				—	—	—	—	—		Yes		
1848		—		—	—	—					—	—		Yes				—	—	—	—	—		—		

Sources: **B/V/X** (Baron, Verner and Xiong, 2021); **B/D/W** (Bordo, Dueker and Wheelock, 2002); **B/H** (Bordo and Haubrich, 2017); **B/W** (Bordo and Wheelock, 1998); **C/G** (Calomiris and Gorton, 1991); **C** (Conant, 1915); **D/R** (Davison and Ramirez, 2014); **DL/S** (DeLong and Summers, 1986); **F/S** (Friedman and Schwartz, 1963); **G** (Gorton, 1988); **J** (Jalil, 2015); **J/K/M/S** (Jamilov, König, Müller and Saidi, 2024); **J/S/T** (Jordà, Schularick and Taylor, 2017); **Ju** (Juglar, 1916); **K** (Kemmerer, 1910); **L/V** (Laeven and Valencia, 2020); **LS/N** (Lopez-Salido and Nelson, 2010); **M/S** (Metrick and Schmelzing, 2021); **R/R** (Reinhart and Rogoff, 2009); **Rb** (Rothbard, 2002); **Ro** (Rockoff, 2021); **So** (Sobel, 1988); **Sp** (Sprague, 1910); **T** (Thorp, 1926); **W** (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1791		—		—		—								—				Yes		—				—	
1792		—		—		—								—				Yes		—		Yes		—	
1797		Yes		Yes		—								—				—		—		—		Yes	
1809		—		Yes*		—						—		—				—		—		—		—	
1814		—		—	Yes	—						Yes		Yes				Yes	Yes	—		—		—	
1815		—		Yes	O	—						—		—				—	—	—		—		Yes	
1816		—		—	O	—						—		—				—	—	—		—		—	
1817		—		—	O	—						—		—				—	Yes	—		—		—	
1818		—		—	—	—						—		Yes				Yes	O	—		—		—	
1819														—				—	O	Yes	Yes	—		—	
1820														—				Yes	—	—	—	—		—	
1825														—				—	Yes	—	—	—		Yes	
1826														—				—	—	—	—	—		—	
1829		—		—	—	—						—		—				Yes	—	—	—	—		—	
1831		—		—	—	—						—		Yes				—	—	—	—	—		—	
1833		—		Yes*	—	—					Yes	—		—				Yes	—	—	—	—		Yes	
1834		—		—	—	—					O	—		—				—	—	—	—	—		—	
1837		Yes		Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes		Yes	
1838		—		—	—	—					—	—		O				—	O	—	—	—		—	
1839		—		Yes	Yes	—					Yes	—		O				Yes	—	—	Yes	—		Yes	
1840		—		—	O	—					—	—		—				—	—	—	—	—		—	
1841		—		—	O	—					Yes*	Yes		—				—	Yes	—	—	—		—	
1842		—		—	O	—					Yes*	—		—				—	—	—	—	—		—	
1847		—		Yes	—	—					—	—		—				—	—	—	—	—		Yes	
1848		—		—	—	—					—	—		Yes				—	—	—	—	—		—	

← Blank space: Chronology does not cover these years

Sources: **B/V/X** (Baron, Verner and Xiong, 2021); **B/D/W** (Bordo, Dueker and Wheelock, 2002); **B/H** (Bordo and Haubrich, 2017); **B/W** (Bordo and Wheelock, 1998); **C/G** (Calomiris and Gorton, 1991); **C** (Conant, 1915); **D/R** (Davison and Ramirez, 2014); **DL/S** (DeLong and Summers, 1986); **F/S** (Friedman and Schwartz, 1963); **G** (Gorton, 1988); **J** (Jalil, 2015); **J/K/M/S** (Jamilov, König, Müller and Saidi, 2024); **J/S/T** (Jordà, Schularick and Taylor, 2017); **Ju** (Juglar, 1916); **K** (Kemmerer, 1910); **L/V** (Laeven and Valencia, 2020); **LS/N** (Lopez-Salido and Nelson, 2010); **M/S** (Metrick and Schmelzing, 2021); **R/R** (Reinhart and Rogoff, 2009); **Rb** (Rothbard, 2002); **Ro** (Rockoff, 2021); **So** (Sobel, 1988); **Sp** (Sprague, 1910); **T** (Thorp, 1926); **W** (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W	
1791		—		—		—								—				Yes		—				—		
1792		—		—		—								—				Yes		—		Yes			—	
1797		Yes		Yes		—								—				—		—		—		Yes		
1809		—		Yes*		—								—				—		—		—		—		
1814		—		—	Yes									—				—		—		—		—		
1815		—		Yes	O									—				—		—		—		Yes		
1816		—		—	O									—				—	—	—		—		—		
1817		—		—	O									—				—	Yes	—		—		—		
1818		—		—	—								Yes					Yes	O			—		—		
1819	Yes			Yes*	Yes	—						Yes		—				—	O	Yes	Yes	—		—		
1820	—			—	—									—				Yes	—	—	—	—		—		
1825	—			Yes*	—	—							Yes					—	Yes	—	—	—		Yes		
1826	—			—	—	—							O					—	—	—	—	—		—		
1829	—			—	—	—							—					Yes	—	—	—	—		—		
1831	—			—	—	—							Yes					—	—	—	—	—		—		
1833	—			Yes*	—	—					Yes	—	—					Yes	—	—	—	—		Yes		
1834	—			—	—	—					O	—	—					—	—	—	—	—		—		
1837	Yes			Yes	Yes	Yes					Yes	Yes	Yes	Yes				Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
1838	—			—	—	—					—	—	—	O				—	O	—	—	—		—		
1839	—			Yes	Yes	—					Yes	—	—	O				Yes	—	—	—	Yes	—	Yes		
1840	—			—	O	—					—	—	—	—				—	—	—	—	—		—		
1841	—			—	O	—					Yes*	Yes	—	—				—	Yes	—	—	—		—		
1842	—			—	O	—					Yes*	—	—	—				—	—	—	—	—		—		
1847	—			Yes	—	—					—	—	—	—				—	—	—	—	—		Yes		
1848	—			—	—	—					—	—	—	Yes				—	—	—	—	—		—		

← Yes: Chronology considers this year start of a crisis

Sources: **B/V/X** (Baron, Verner and Xiong, 2021); **B/D/W** (Bordo, Dueker and Wheelock, 2002); **B/H** (Bordo and Haubrich, 2017); **B/W** (Bordo and Wheelock, 1998); **C/G** (Calomiris and Gorton, 1991); **C** (Conant, 1915); **D/R** (Davison and Ramirez, 2014); **DL/S** (DeLong and Summers, 1986); **F/S** (Friedman and Schwartz, 1963); **G** (Gorton, 1988); **J** (Jalil, 2015); **J/K/M/S** (Jamilov, König, Müller and Saidi, 2024); **J/S/T** (Jordà, Schularick and Taylor, 2017); **Ju** (Juglar, 1916); **K** (Kemmerer, 1910); **L/V** (Laeven and Valencia, 2020); **LS/N** (Lopez-Salido and Nelson, 2010); **M/S** (Metrick and Schmelzing, 2021); **R/R** (Reinhart and Rogoff, 2009); **Rb** (Rothbard, 2002); **Ro** (Rockoff, 2021); **So** (Sobel, 1988); **Sp** (Sprague, 1910); **T** (Thorp, 1926); **W** (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W	
1791		—		—		—								—				Yes		—				—		
1792		—		—		—								—				Yes		—		Yes			—	
1797		Yes		Yes		—								—				—		—		—		Yes		
1809		—		Yes*		—						—		—				—	—	—		—		—		
1814		—		—	Yes							—		—				—	—	—		—		—		
1815		—		Yes	O									—				—	—	—		—		Yes		
1816		—		—	O									—				—	—	—		—		—		
1817		—		—	O									—				—	—	—		—		—		
1818		—		—	—	—								Yes				Yes	O	—		—		—		
1819	Yes			Yes*	Yes	—						Yes		—				—	O	Yes	Yes	—		—		
1820	—			—	—	—								—				Yes	—	—	—	—		—		
1825	—			Yes*	—	—								Yes				—	Yes	—	—	—		Yes		
1826	—			—	—	—								O				—	—	—	—	—		—		
1829	—			—	—	—								—				Yes	—	—	—	—		—		
1831	—			—	—	—								Yes				—	—	—	—	—		—		
1833	—			Yes*	—	—					Yes	—		—				Yes	—	—	—	—		Yes		
1834	—			—	—	—					O	—		—				—	—	—	—	—		—		
1837	Yes			Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes		Yes		
1838	—			—	—	—					—	—		O				—	O	—	—	—		—		
1839	—			Yes	Yes	—					Yes	—		O				Yes	—	—	Yes	—		Yes		
1840	—			—	O	—					—	—		—				—	—	—	—	—		—		
1841	—			—	O	—					Yes*	Yes		—				—	Yes	—	—	—		—		
1842	—			—	O	—					Yes*	—		—				—	—	—	—	—		—		
1847	—			Yes	—	—					—	—		—				—	—	—	—	—		Yes		
1848	—			—	—	—					—	—		Yes				—	—	—	—	—		—		

← O: Chronology considers these as ongoing crises

Sources: **B/V/X** (Baron, Verner and Xiong, 2021); **B/D/W** (Bordo, Dueker and Wheelock, 2002); **B/H** (Bordo and Haubrich, 2017); **B/W** (Bordo and Wheelock, 1998); **C/G** (Calomiris and Gorton, 1991); **C** (Conant, 1915); **D/R** (Davison and Ramirez, 2014); **DL/S** (DeLong and Summers, 1986); **F/S** (Friedman and Schwartz, 1963); **G** (Gorton, 1988); **J** (Jalil, 2015); **J/K/M/S** (Jamilov, König, Müller and Saidi, 2024); **J/S/T** (Jordà, Schularick and Taylor, 2017); **Ju** (Juglar, 1916); **K** (Kemmerer, 1910); **L/V** (Laeven and Valencia, 2020); **LS/N** (Lopez-Salido and Nelson, 2010); **M/S** (Metrick and Schmelzing, 2021); **R/R** (Reinhart and Rogoff, 2009); **Rb** (Rothbard, 2002); **Ro** (Rockoff, 2021); **So** (Sobel, 1988); **Sp** (Sprague, 1910); **T** (Thorp, 1926); **W** (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1791		—		—		—								—				Yes		—				—	
1792		—		—		—								—				Yes		—		Yes			—
1797		Yes		Yes		—								—				—		—		—		Yes	
1809		—		Yes*		—						—		—				—		—		—		—	
1814		—		—	Yes	—						Yes		Yes				Yes	Yes	—		—		—	
1815		—		Yes	O	—						—		—				—	—	—		—		Yes	
1816		—		—	O	—						—		—				—	—	—		—		—	
1817		—		—	O	—						—		—				—	Yes	—		—		—	
1818		—		—	—	—						—		Yes				Yes	O	—		—		—	
1819	Yes			Yes*	Yes	—						Yes		—				—	O	Yes	Yes	—		—	
1820	—	—		—	—	—						—		—				Yes	—	—	—	—		—	
1825	—	—		Yes*	—	—					—	—		Vac				—	Vac	—	—	—		—	Yes
1826	—	—		—	—	—						—		—				—	—	—	—	—		—	—
1829	—	—		—	—	—						—		—				—	—	—	—	—		—	—
1831	—	—		—	—	—						—		—				—	—	—	—	—		—	—
1833	—	—		Yes*	—	—					Yes	—		—				Yes	—	—	—	—		—	Yes
1834	—	—		—	—	—					O	—		—				—	—	—	—	—		—	—
1837	Yes			Yes	Yes	Yes					Yes	Yes		Yes				Yes	Yes	Yes	Yes	Yes		Yes	Yes
1838	—	—		—	—	—					—	—		O				—	O	—	—	—		—	—
1839	—	—		Yes	Yes	—					Yes	—		O				Yes	—	—	Yes	—		Yes	—
1840	—	—		—	O	—					—	—		—				—	—	—	—	—		—	—
1841	—	—		—	O	—					Yes*	Yes		—				—	Yes	—	—	—		—	—
1842	—	—		—	O	—					Yes*	—		—				—	—	—	—	—		—	—
1847	—	—		Yes	—	—					—	—		—				—	—	—	—	—		Yes	—
1848	—	—		—	—	—					—	—		Yes				—	—	—	—	—		—	—

← — : Chronology says there is no crisis

Sources: **B/V/X** (Baron, Verner and Xiong, 2021); **B/D/W** (Bordo, Dueker and Wheelock, 2002); **B/H** (Bordo and Haubrich, 2017); **B/W** (Bordo and Wheelock, 1998); **C/G** (Calomiris and Gorton, 1991); **C** (Conant, 1915); **D/R** (Davison and Ramirez, 2014); **DL/S** (DeLong and Summers, 1986); **F/S** (Friedman and Schwartz, 1963); **G** (Gorton, 1988); **J** (Jalil, 2015); **J/K/M/S** (Jamilov, König, Müller and Saidi, 2024); **J/S/T** (Jordà, Schularick and Taylor, 2017); **Ju** (Juglar, 1916); **K** (Kemmerer, 1910); **L/V** (Laeven and Valencia, 2020); **LS/N** (Lopez-Salido and Nelson, 2010); **M/S** (Metrick and Schmelzing, 2021); **R/R** (Reinhart and Rogoff, 2009); **Rb** (Rothbard, 2002); **Ro** (Rockoff, 2021); **So** (Sobel, 1988); **Sp** (Sprague, 1910); **T** (Thorp, 1926); **W** (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1899	—	—	—	—	—	—	—	Yes	—	—	Yes*	—	—	—	Yes	—	—	—	—	—	—	—	—	—	—
1901	—	—	—	—	—	—	—	Yes	—	—	Yes*	—	—	—	Yes	—	—	—	—	—	—	Yes	—	—	—
1902	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—
1903	—	—	—	—	—	—	—	Yes	—	—	Yes*	—	—	Yes	Yes	—	—	—	—	—	—	—	—	—	—
1904	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—
1905	—	—	—	—	—	—	—	Yes	—	—	Yes*	—	—	—	Yes*	—	—	Yes	—	—	—	—	—	—	—
1906	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—
1907	Yes	—	Yes	Yes	Yes	Yes	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—	—	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1908	—	—	—	—	—	—	—	—	—	—	Yes*	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—
1909	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—
1914	—	—	Yes	—	Yes	—	—	—	—	Yes	—	—	—	—	—	—	Yes	Yes	—	—	—	Yes	—	—	—
1917	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1920	—	—	—	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1923	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1924	—	—	—	—	—	—	—	Yes*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1926	—	—	—	—	—	—	—	Yes*	—	—	Yes*	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1927	—	—	—	—	—	—	—	Yes*	—	—	Yes*	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1929	—	—	—	—	—	—	—	Yes*	—	—	Yes*	Yes	—	—	—	—	Yes	Yes	Yes	—	—	Yes	—	—	—
1930	Yes	—	Yes	Yes	—	—	—	—	Yes	—	—	Yes	Yes	—	—	—	—	—	O	—	Yes	—	—	—	Yes
1931	—	Yes	O	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	Yes
1932	—	O	O	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	O	—	—	—	—	—	Yes
1933	—	—	O	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	Yes
1939	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1958	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—

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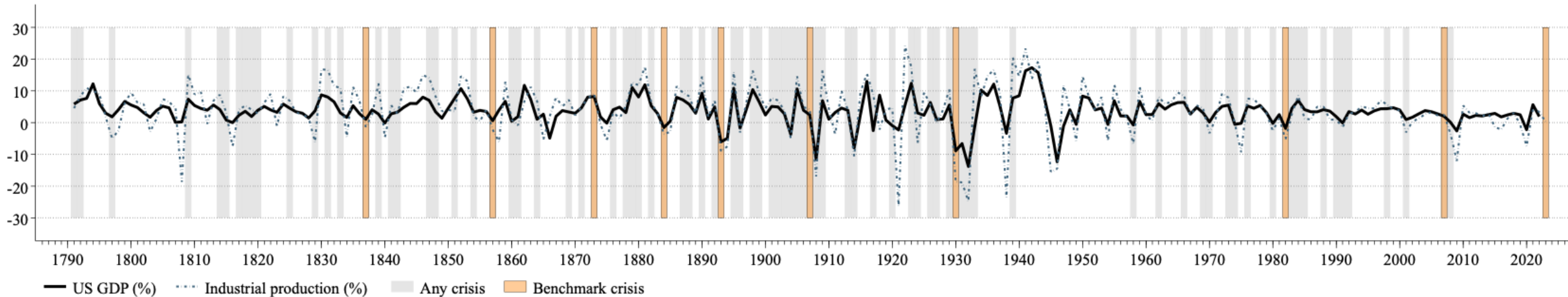
Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1962	—	—	—									—	—				—	—	—		—	Yes			
1966	—	—	—									—	—				—	Yes	—		—	—			
1969	—	—	—									—	—				—	Yes	—		—	—			
1970	—	—	—									—	—			—	—	Yes	—		—	—			
1973	—	—	Yes									—	—			—	Yes	—	—		—	—			
1974	—	—	O									—	—			—	O	Yes	—		—	—			
1975	—	—	O									—	—			—	O	—	—		—	—			
1976	—	—	—									—	—			—	—	Yes	—		—	—			
1980	—	—	—									—	—			—	—	Yes	—		—	—			
1982	—	Yes	Yes									Yes	—			—	Yes	—	—		—	—			
1983	—	O	O									Yes	—			—	O	—	—		—	—			
1984	Yes	O	O									Yes	Yes			—	O	Yes	Yes		—	—			
1985	—	O	—									Yes	—			—	—	—	O		—	—			
1986	—	O	—									—	—			—	—	—	O		—	—			
1987	—	—	—									—	—			—	—	—	O		—	—			
1988	—	—	Yes									—	—			Yes	Yes	—	O		—	—			
1989	—	—	O									—	—			—	O	—	O		—	—			
1990	Yes	—	O									—	—			—	O	—	O		—	—			
1991	—	—	O									Yes	—			—	O	—	O		—	—			
1992	—	—	—									Yes	—			—	—	—	—		—	—			
1998	—	—	—									—	—			—	—	Yes	—		—	—			
2001	—	—	—									—	—			—	—	Yes	—		—	—			
2007	Yes	—	Yes									Yes	Yes			Yes	—	Yes	Yes		—	—			
2008	—	—	—									Yes	—			—	—	—	O		Yes	—			
2009	—	—	—									—	—			—	—	—	O		—	—			
2010	—	—	—									—	—			—	—	—	O		—	—			

Sources: B/V/X (Baron, Verner and Xiong, 2021); B/D/W (Bordo, Dueker and Wheelock, 2002); B/H (Bordo and Haubrich, 2017); B/W (Bordo and Wheelock, 1998); C/G (Calomiris and Gorton, 1991); C (Conant, 1915); D/R (Davison and Ramirez, 2014); DL/S (DeLong and Summers, 1986); F/S (Friedman and Schwartz, 1963); G (Gorton, 1988); J (Jalil, 2015); J/K/M/S (Jamilov, König, Müller and Saidi, 2024); J/S/T (Jordà, Schularick and Taylor, 2017); Ju (Juglar, 1916); K (Kemmerer, 1910); L/V (Laeven and Valencia, 2020); LS/N (Lopez-Salido and Nelson, 2010); M/S (Metrick and Schmelzing, 2021); R/R (Reinhart and Rogoff, 2009); Rb (Rothbard, 2002); Ro (Rockoff, 2021); So (Sobel, 1988); Sp (Sprague, 1910); T (Thorp, 1926); W (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Financial crises and output growth, 1790-2022

A long view on crises and output



Systemic crises: 1837, 1857, 1873, 1884, 1893, 1907, 1930, 1982, 2007, (2023)

Crisis definitions: Systemic crisis: Majority of chronologies agree a year is a crisis, added 1982 based on Lopez-Salido and Nelson (2010)
Any crisis: List of potential crisis events, i.e. years flagged by at least one chronology.

Data sources: GDP: BEA and Williamson (2024); Industrial Production: Federal Reserve, Miron and Romer (1990), Davis (2004)

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1962	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes
1966	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1969	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1970	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1973	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1974	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	Yes	—	—	—	—	—	—	—
1975	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—	—	—
1976	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1980	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1982	—	Yes	Yes	—	—	—	—	—	—	—	—	Yes	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1983	—	O	O	—	—	—	—	—	—	—	—	Yes	—	—	—	—	O	—	—	—	—	—	—	—	—
1984	Yes	O	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	Yes	Yes	—	—	—	—	—	—
1985	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1986	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1987	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1988	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	Yes	Yes	—	O	—	—	—	—	—	—
1989	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	O	—	—	—	—	—	—
1990	Yes	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	O	—	—	—	—	—	—
1991	—	—	O	—	—	—	—	—	—	—	—	Yes	—	—	—	—	O	—	O	—	—	—	—	—	—
1992	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	—
1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
2007	Yes	—	Yes	—	—	—	—	—	—	—	—	Yes	Yes	—	—	Yes	—	Yes	Yes	—	—	—	—	—	—
2008	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	O	—	—	—	—	—	Yes
2009	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
2010	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—

Lopez-Salido and Nelson (2010):
 1982 and 1988 are separate events



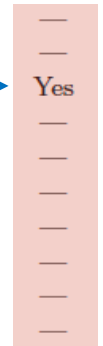
Yes
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Sources: B/V/X (Baron, Verner and Xiong, 2021); B/D/W (Bordo, Dueker and Wheelock, 2002); B/H (Bordo and Haubrich, 2017); B/W (Bordo and Wheelock, 1998); C/G (Calomiris and Gorton, 1991); C (Conant, 1915); D/R (Davison and Ramirez, 2014); DL/S (DeLong and Summers, 1986); F/S (Friedman and Schwartz, 1963); G (Gorton, 1988); J (Jalil, 2015); J/K/M/S (Jamilov, König, Müller and Saidi, 2024); J/S/T (Jordà, Schularick and Taylor, 2017); Ju (Juglar, 1916); K (Kemmerer, 1910); L/V (Laeven and Valencia, 2020); LS/N (Lopez-Salido and Nelson, 2010); M/S (Metrick and Schmelzing, 2021); R/R (Reinhart and Rogoff, 2009); Rb (Rothbard, 2002); Ro (Rockoff, 2021); So (Sobel, 1988); Sp (Sprague, 1910); T (Thorp, 1926); W (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.

Comparing 25 crisis chronologies

Year	B/V/X	B/D/W	B/H	B/W	C/G	C	D/R	DL/S	F/S	G	J	J/K/M/S	J/S/T	Ju	K	L/V	LS/N	M/S	R/R	Rb	Ro	So	Sp	T	W
1962	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes
1966	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1969	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1970	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1973	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1974	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	Yes	—	—	—	—	—	—	—
1975	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—	—	—
1976	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1980	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
1982	—	Yes	Yes	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—
1983	—	O	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—	—	—
1984	Yes	O	O	—	—	—	—	—	—	—	—	—	Yes	—	—	—	O	Yes	Yes	—	—	—	—	—	—
1985	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1986	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1987	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
1988	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	Yes	Yes	—	O	—	—	—	—	—	—
1989	—	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	O	—	—	—	—	—	—
1990	Yes	—	O	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	O	—	—	—	—	—	—
1991	—	—	O	—	—	—	—	—	—	—	—	Yes	—	—	—	—	O	—	O	—	—	—	—	—	—
1992	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—	—	—	—	—	—	—
1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	—
2007	Yes	—	Yes	—	—	—	—	—	—	—	—	Yes	Yes	—	—	Yes	—	Yes	Yes	—	—	—	—	—	—
2008	—	—	—	—	—	—	—	—	—	—	—	Yes	—	—	—	—	—	—	O	—	—	—	—	—	Yes
2009	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—
2010	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	O	—	—	—	—	—	—

Jordà, Schularick, and Taylor (2017):
1984 is the only crisis event



Sources: B/V/X (Baron, Verner and Xiong, 2021); B/D/W (Bordo, Dueker and Wheelock, 2002); B/H (Bordo and Haubrich, 2017); B/W (Bordo and Wheelock, 1998); C/G (Calomiris and Gorton, 1991); C (Conant, 1915); D/R (Davison and Ramirez, 2014); DL/S (DeLong and Summers, 1986); F/S (Friedman and Schwartz, 1963); G (Gorton, 1988); J (Jalil, 2015); J/K/M/S (Jamilov, König, Müller and Saidi, 2024); J/S/T (Jordà, Schularick and Taylor, 2017); Ju (Juglar, 1916); K (Kemmerer, 1910); L/V (Laeven and Valencia, 2020); LS/N (Lopez-Salido and Nelson, 2010); M/S (Metrick and Schmelzing, 2021); R/R (Reinhart and Rogoff, 2009); Rb (Rothbard, 2002); Ro (Rockoff, 2021); So (Sobel, 1988); Sp (Sprague, 1910); T (Thorp, 1926); W (Wicker, 2000, 2006). We use the most recent updates of these chronologies whenever possible, including those by J/K/M/S, J/S/T, and R/R.



Supplementary slides

Data

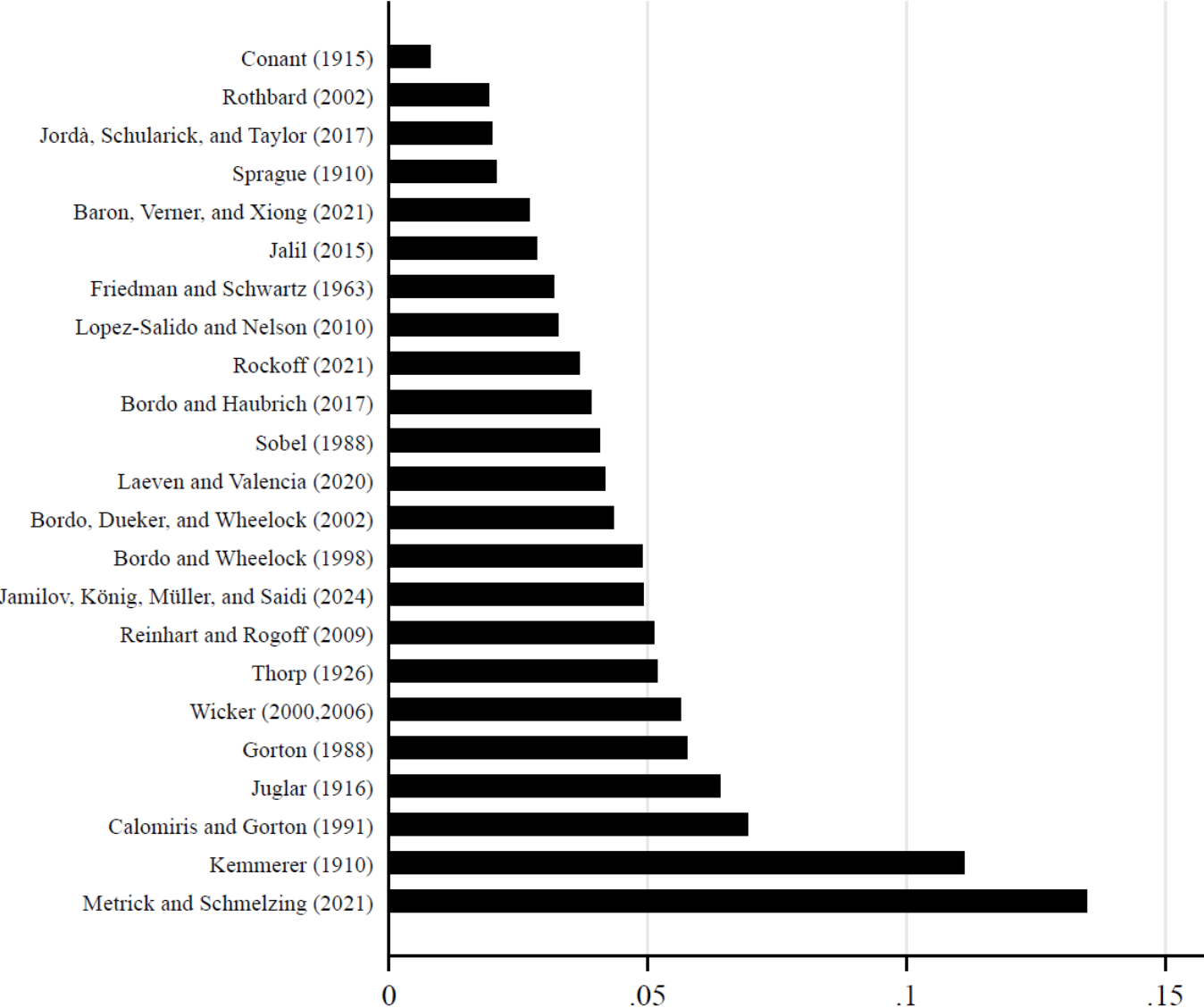


Examples of definitions in existing crisis chronologies

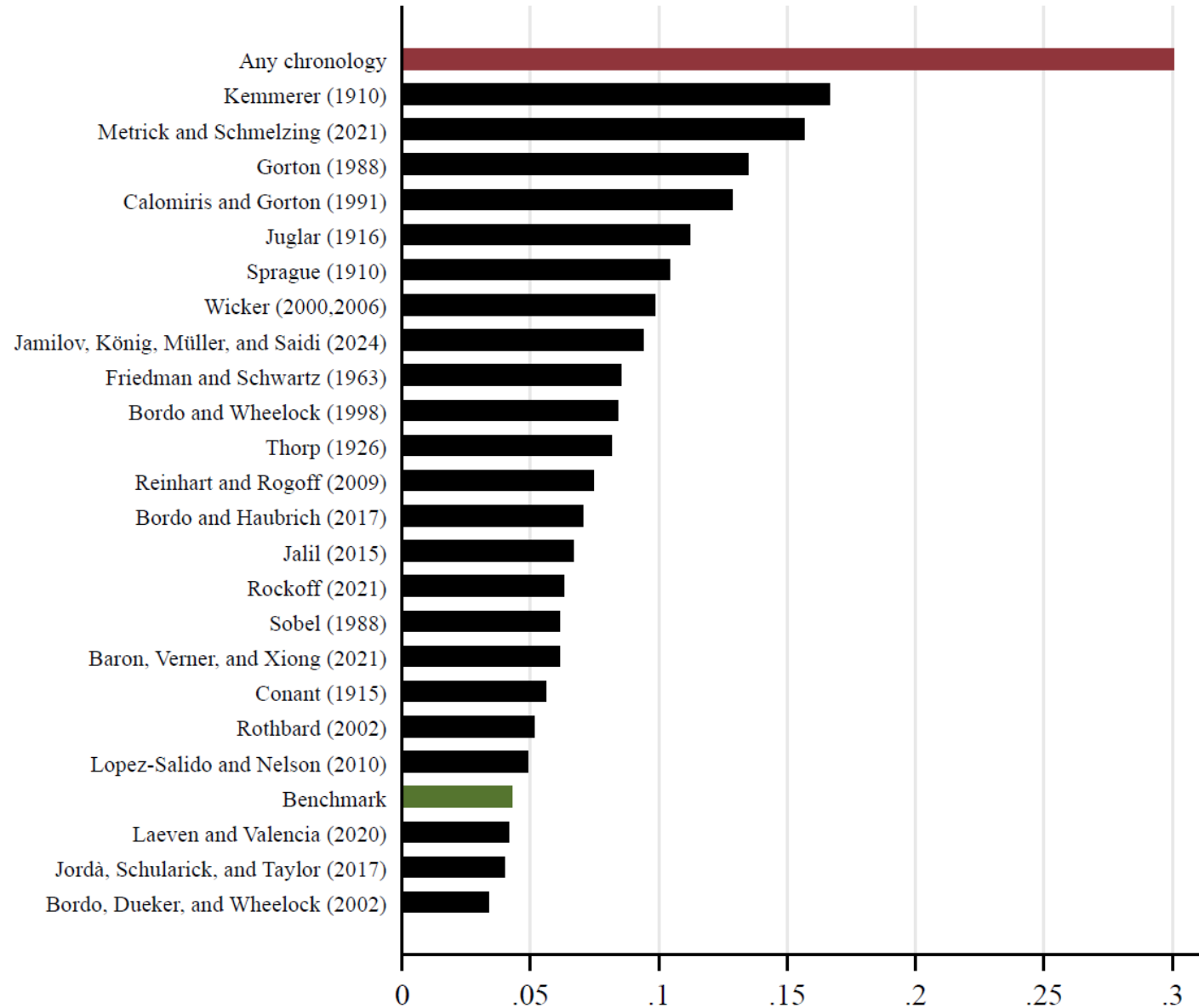
Source	Abbr.	Indicator type	Time coverage	Definition
Baron et al. (2021)	B/V/X	Banking crisis dummy (start-year only)	1870–2016	“Our conceptual definition of a banking crisis is an episode in which the banking sector’s ability to intermediate funds is severely impaired. Because equity holders are the first to suffer losses from a banking crisis that damages banks’ intermediation capacity, we assume that conceptually, a large bank equity decline is necessary for a banking crisis.” (p. 52)
Bordo et al. (2002)	B/D/W	Index of fin. conditions with five categories: 1. severe distress, 2. moderate distress, 3. normal, 4. moderate expansion, 5. euphoria.	1790–1997	<p>The authors construct an annual index of financial conditions, classifying each year from 1790 to 1997 into one of five categories: 1. <i>severe distress</i>, 2. <i>moderate distress</i>, 3. <i>normal</i>, 4. <i>moderate expansion</i>, 5. <i>euphoria</i>. The index is based on narrative sources prior to 1870 and on four quantitative indicators for 1870–1997: business failure rates, the real interest rate, the interest rate quality spread, and banking conditions. These series are aggregated to construct the index separately for the subperiods 1870–1933 and 1934–1997, as follows:</p> <ol style="list-style-type: none"> 1. For each series, compute the differences between annual observations and the series median for the subperiod, then divide it by the subperiod standard deviation. 2. Within each subperiod, sum the standardized differences across the four series for each year. Classify a year as <i>euphoria</i> (<i>severe distress</i>) if the summed standardized difference exceeds 1.5 (–1.5) standard deviations from the overall mean. Classify it as <i>moderate expansion</i> (<i>moderate distress</i>) if the summed difference is within ± 0.75 and ± 1.5 standard deviations, and as <i>normal</i> if the summed difference falls between –0.75 and 0.75 standard deviations. (p. 526) <p>In Table 1, a year is labeled “Yes” if it is classified as a <i>severe distress</i> episode.</p>
Bordo and Haubrich (2017)	B/H	Financial crisis dummy	1880–2007	<p>The authors apply the banking crisis definition of Eichengreen and Bordo (2002) for the years prior to WWII, and additionally include 1914, a year in which the bond markets closed. The definition of Eichengreen and Bordo is outlined as follows:</p> <p>“For an episode to qualify as a banking crisis, we must observe either bank runs, widespread bank failures and the suspension of convertibility of deposits into currency such that the latter circulates at a premium relative to deposits (a banking panic), or significant banking sector problems (including but not limited to bank failures) resulting in the erosion of most or all of banking system collateral that are resolved by a fiscally underwritten bank restructuring.” (Eichengreen and Bordo, 2002, pp. 15–16)</p> <p>For the post-WWII years, the authors apply the chronology of Lopez-Salido and Nelson (2010), and additionally include 2007. (Bordo and Haubrich, 2017, p. 533)</p>
Bordo and Wheelock (1998)	B/W	Financial crisis dummy	1790–1929	“We define a financial crisis as a banking panic, which is an event characterized by widespread depositor runs on banks, leading to a decline in the deposit/currency ratio and possibly many bank failures.” (p. 44)

Discrepancies between our chronology and existing lists

Where they overlap, our benchmark crisis list is broadly in line with existing chronologies



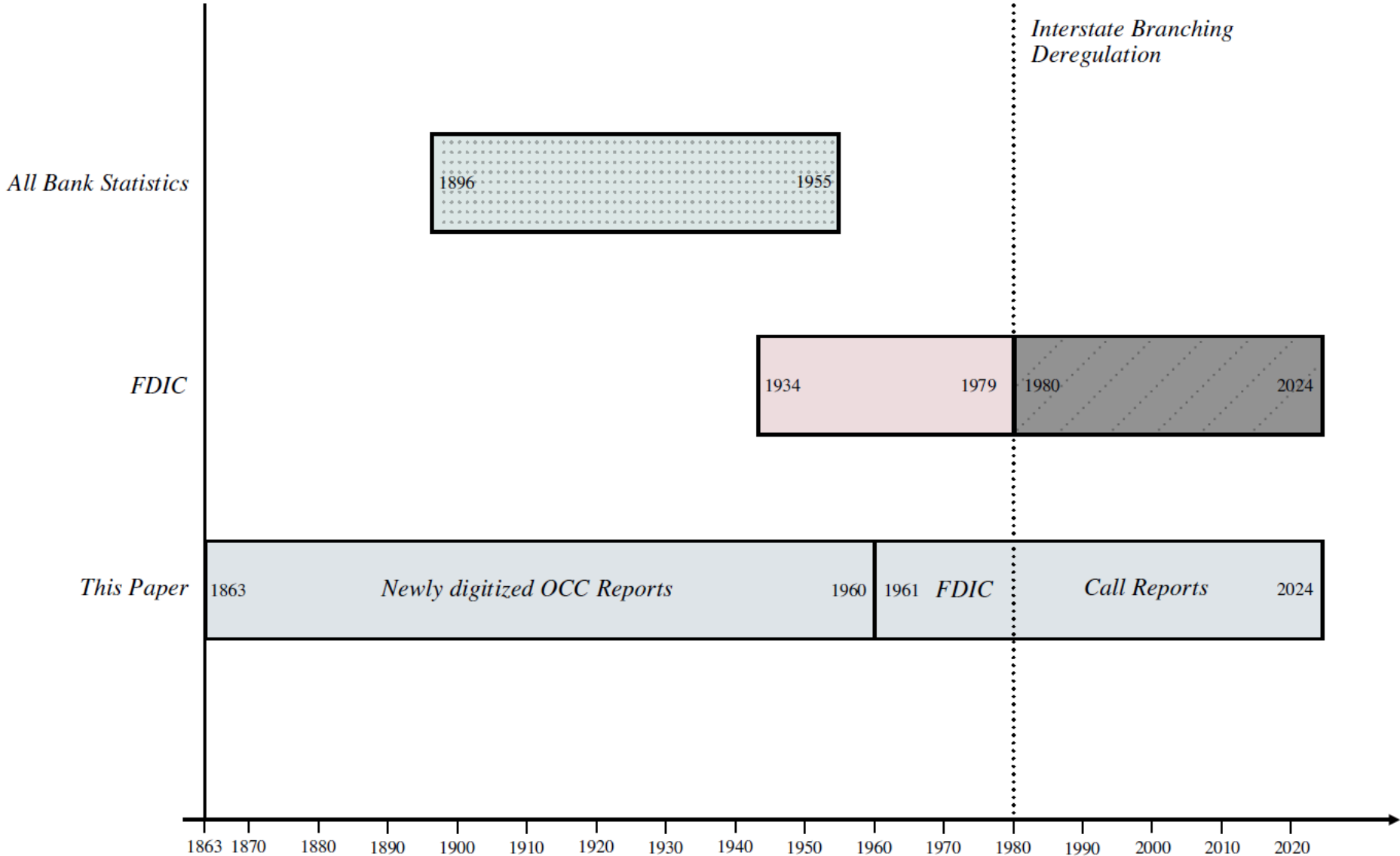
The probability of a crisis varies across chronologies



Coverage of the new banking dataset

Variable	Code	Period	Frequency	Sample	Main Sources
Bank Assets (\$)	BNKASST	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Capital (\$)	BNKCAP	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Loans (\$)	BNKLOAN	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Real Estate Loans (\$)	BNKRELOAN	1886–1909 1911–2010	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Liabilities (\$)	BNKLIAB	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports
Bank Deposits (\$)	BNKDEP	1863–2024	Annual	All States	OCC/FDIC/SOD/Call Reports

Coverage relative to existing datasets



Descriptive statistics by bank type and variable

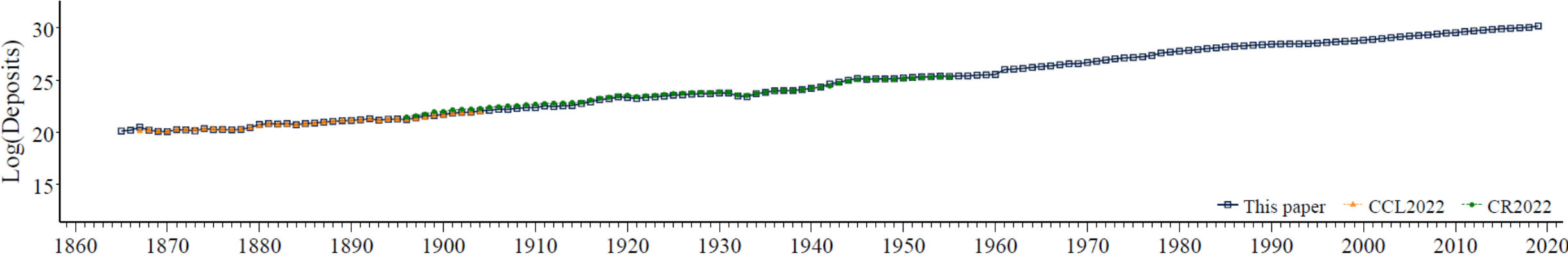
		Institution type	Assets	Asset subcategories		Liabilities	Liability subcategories	
				Loans	Real estate loans		Deposits	Capital
All states + D.C.	No. of observations	National banks	4,671	4,671	2,159	4,698	4,656	4,698
		State banks	3,652	3,650	2,579	3,651	3,650	3,651
		Private banks	1,319	1,319	1,131	1,319	1,318	1263
		Savings banks	143	143	153	143	143	9
		Stock savings banks	765	744	577	744	744	741
		Mutual savings banks	1,145	1,145	1,060	1,145	1,145	70
		Trust loan companies	1,271	1,257	919	1,257	1,241	1,257
	Pctg. non-missing	National banks	93%	93%	43%	94%	93%	94%
		State banks	73%	73%	52%	73%	73%	73%
		Private banks	26%	26%	23%	26%	26%	25%
		Savings banks	3%	3%	3%	3%	3%	0%
		Stock savings banks	15%	15%	12%	15%	15%	15%
		Mutual savings banks	23%	23%	21%	23%	23%	1%
		Trust loan companies	25%	25%	18%	25%	25%	25%

Examples of variable mapping in OCC reports

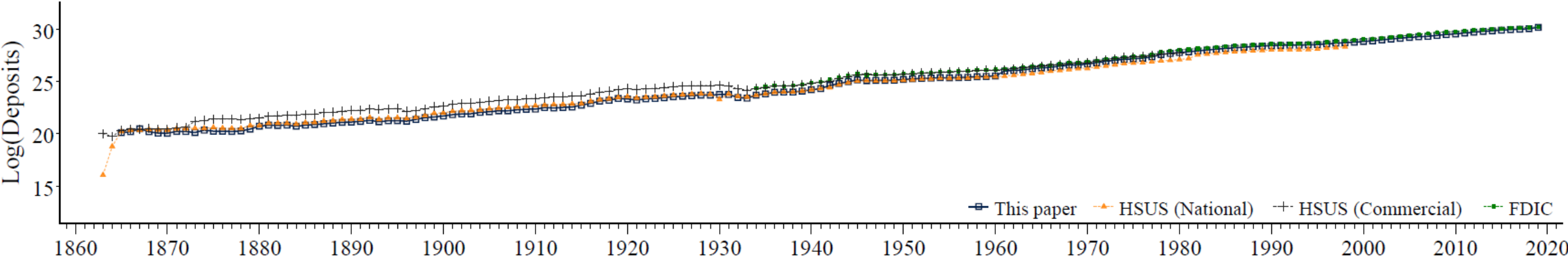
Totals	Principal (FDIC Code if applicable)	Subitems	Examples of Items subsumed by Subitems in OCC Report
ASSETS			
Cash			
Total Cash	Cash on hand	Cash on hand (s)	Gold Coin, Fractional Currency, Gold Certificates
Total Cash	Cash items		
Total Cash	Other Cash		

Comparison with other sources of bank data

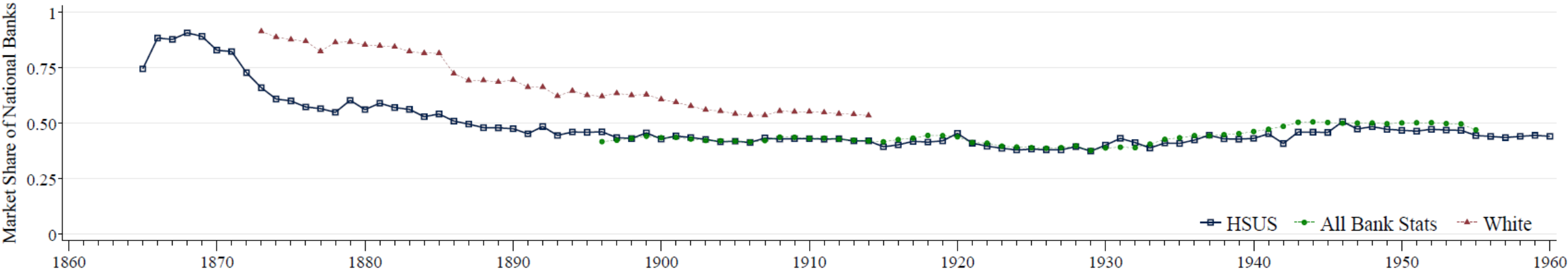
(a) Bank Deposits – This Paper vs. Cao and Richardson (2022, CR2022) and Carlson, Correia, and Luck (2022, CCL2022)



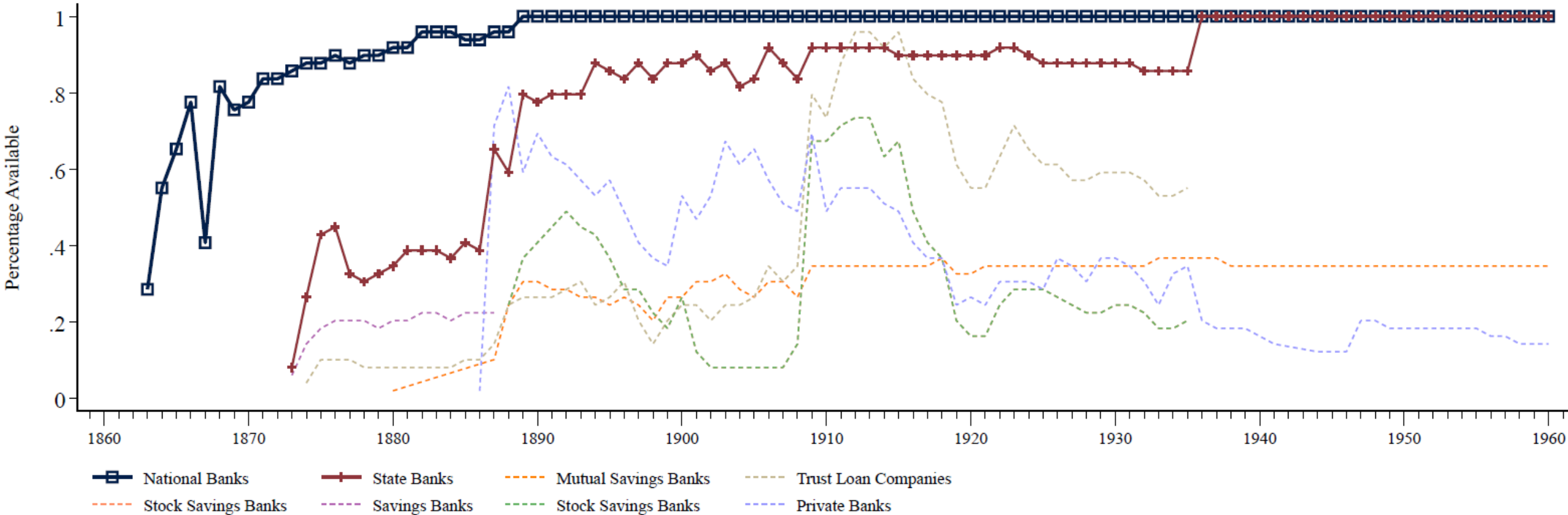
(b) Bank Deposits - This Paper vs. HSUS and FDIC



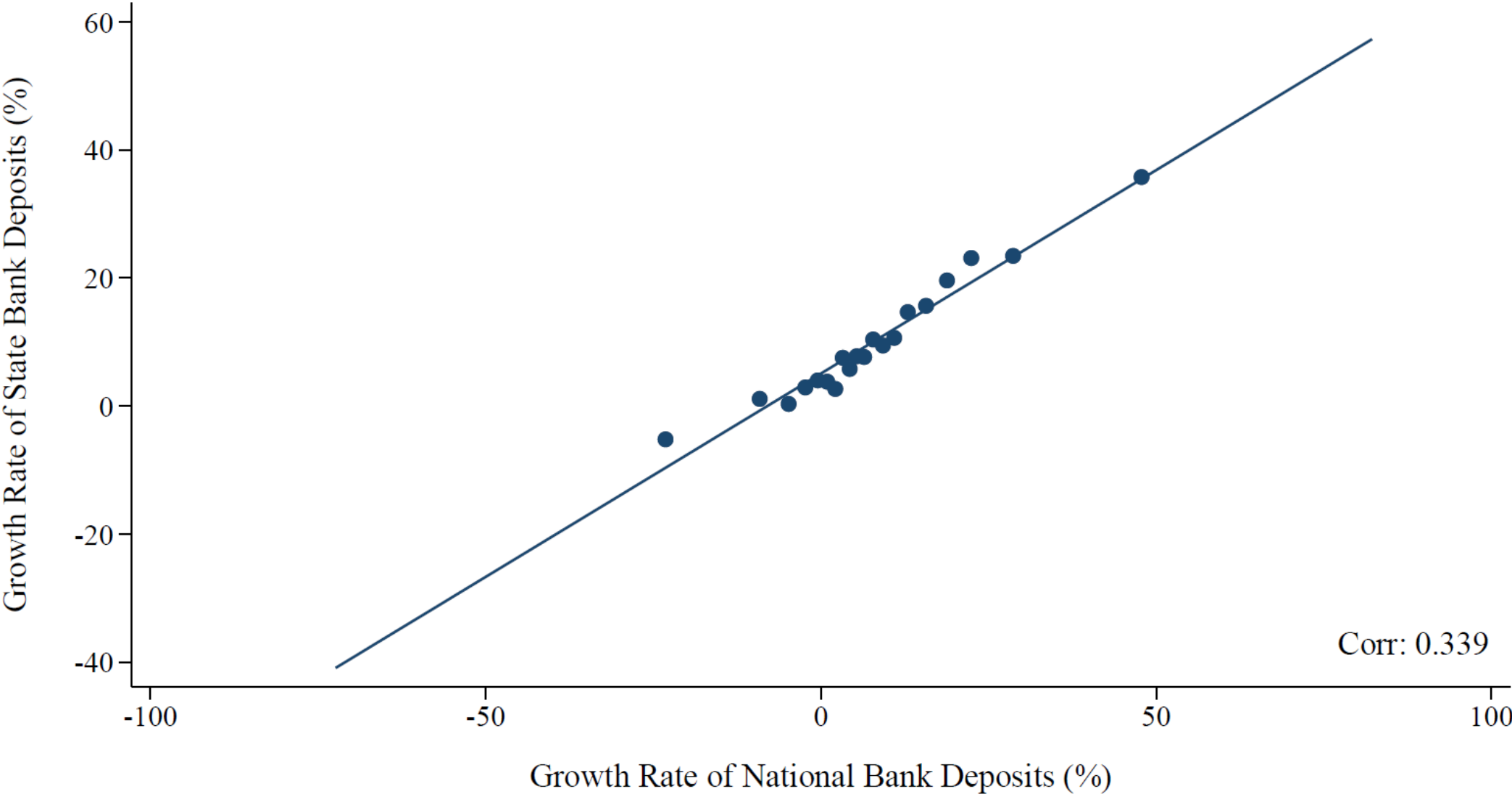
Market share of national banks, 1865-1960



Coverage of different banks in the OCC reports



Correlation between national and state bank deposits

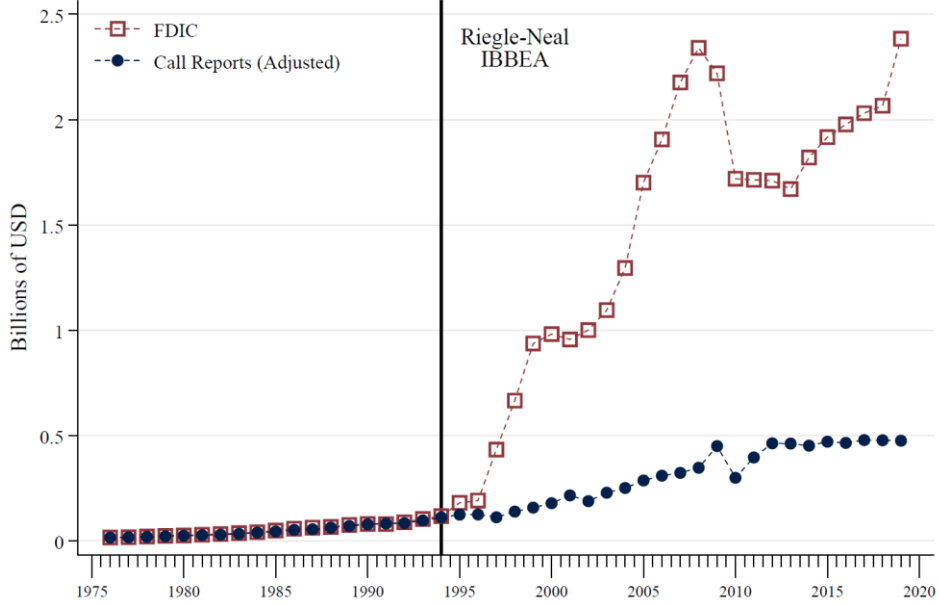
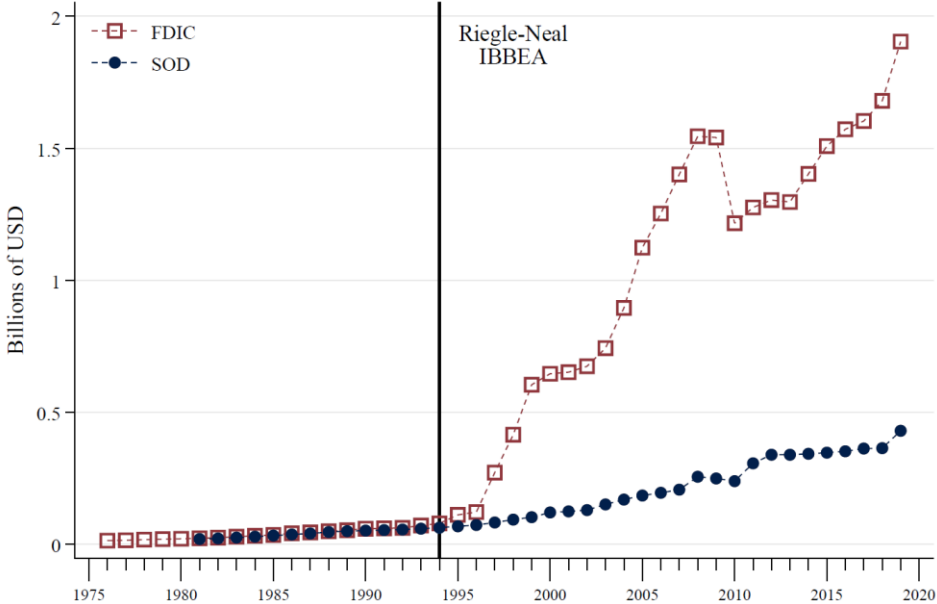
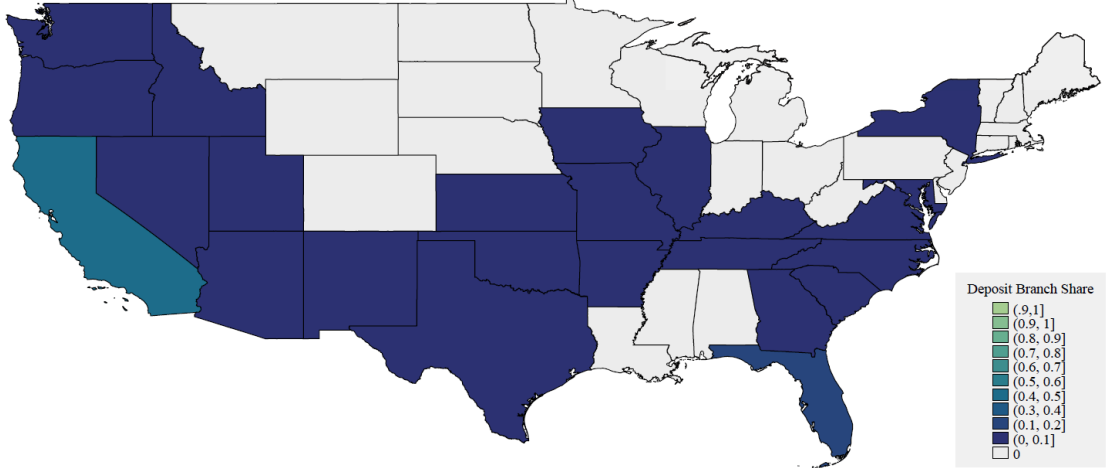


Re-weighting total assets: North Carolina example

(a) Bank of America's deposits in 1993

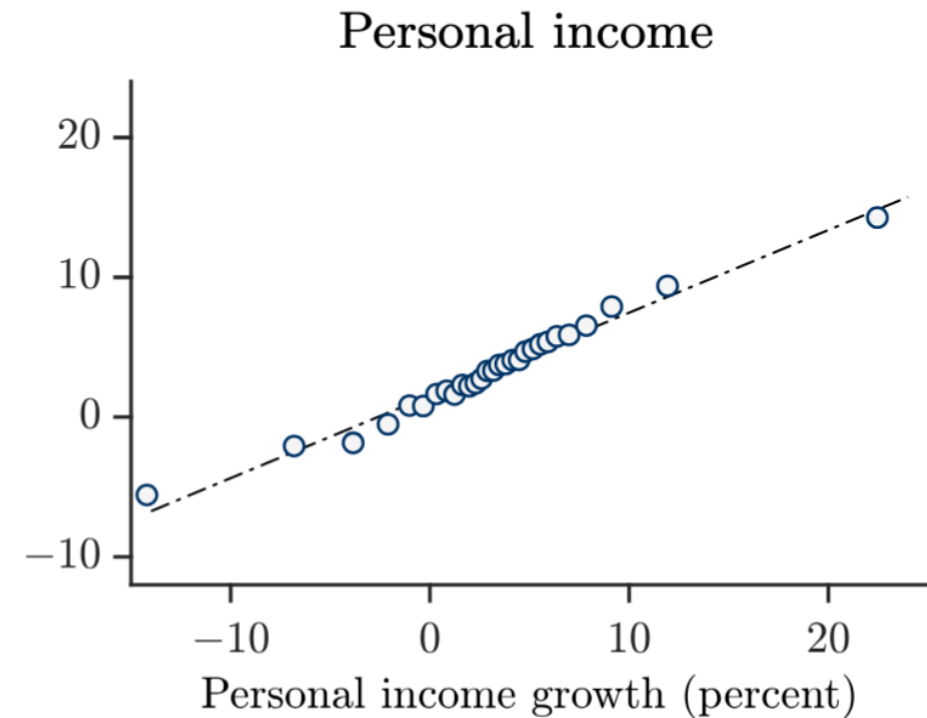
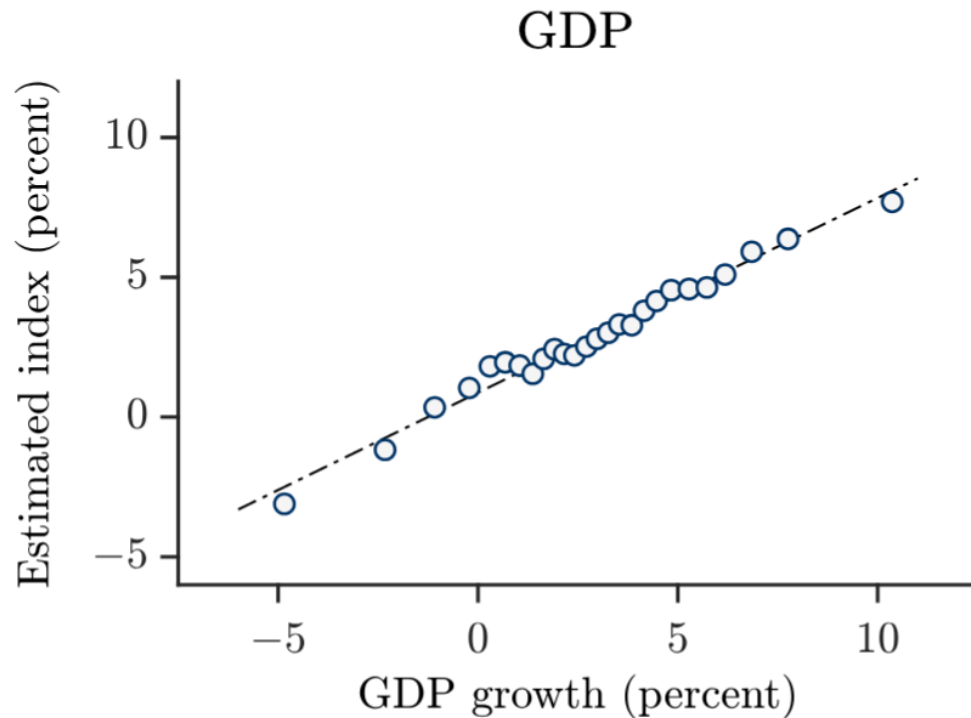


(b) Bank of America's deposits in 2000



Validation of the index of economic activity

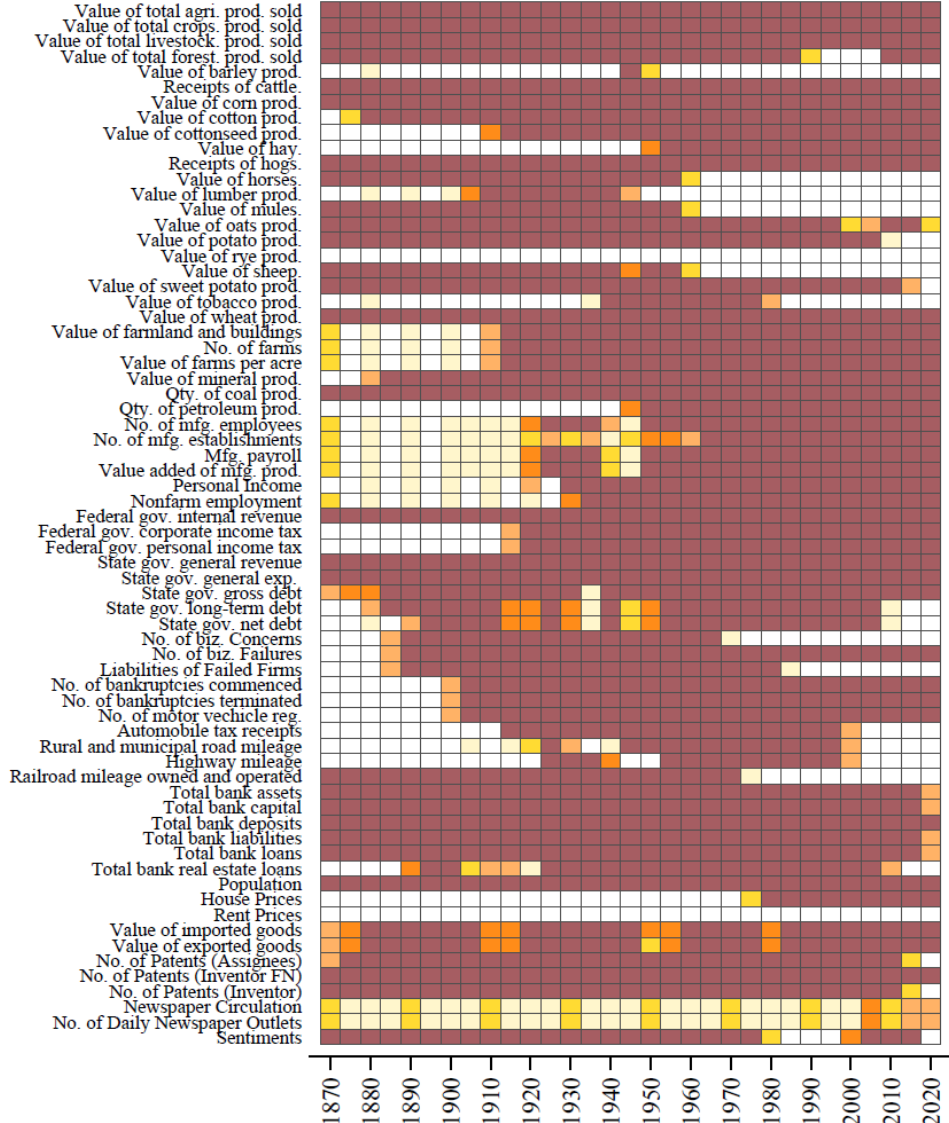
The index is highly correlated with personal income and GDP where their coverage overlaps



Data sources: State-level GDP, Personal Income: BEA; Economic Activity Index: Hoon, Liu, Müller, and Zheng (2025)

Examples of time series coverage

Introduced in a companion paper (Hoon, Liu, Müller, and Zheng, 2025)



Examples of sources of state-level economic activity data

Introduced in a companion paper (Hoon, Liu, Müller, and Zheng, 2025)

Source (Variable)	Start	End	Frequency
<i>Panel A: Examples of Digitized Sources (98 in total)</i>			
Statistical Abstract (Value of Imports of Merchandise, # Business Failures, Various)	1860	2018	Annual
Census Compendium (Non-farm Employment, Crop Receipts, Various)	1870	2021	Decennial
Livestock on Farms (Sheep Value)	1869	1935	Annual
Biennial Report of the Territorial Treasurer to the Governor of the Territory of Arizona (State Govt. Rev.)	1886	1911	Annual
<i>Panel B: Examples of Existing Sources (37 in total)</i>			
BEA (Personal Income)	1929	2021	Annual
BEA (GDP)	1963	2021	Annual
USDA (Crop Receipts)	1924	2021	Annual
Van Binsbergen et al. (2024) (Sentiments)	1850	2019	Annual



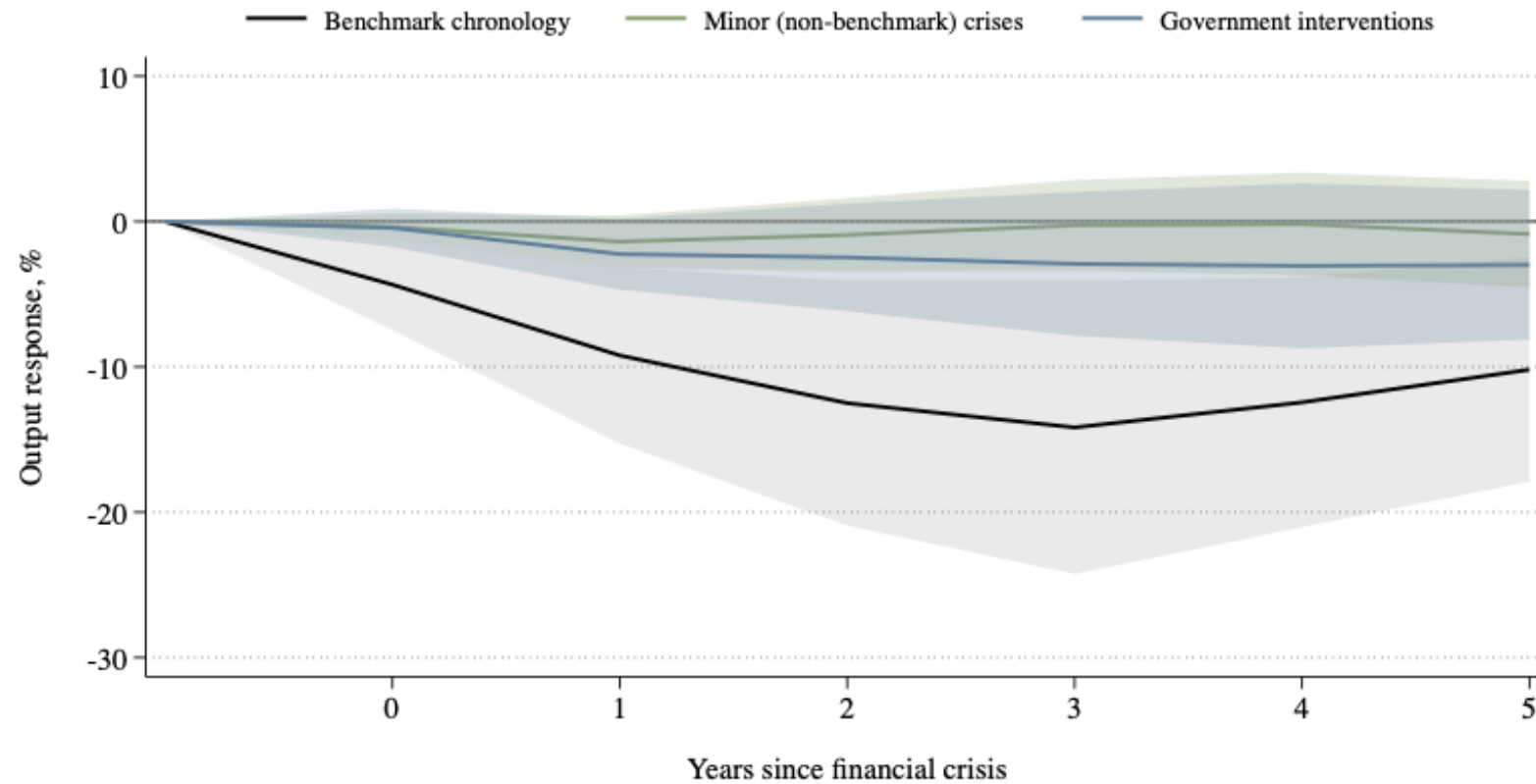
Supplementary slides

U.S.-wide crisis results



Other crisis definitions

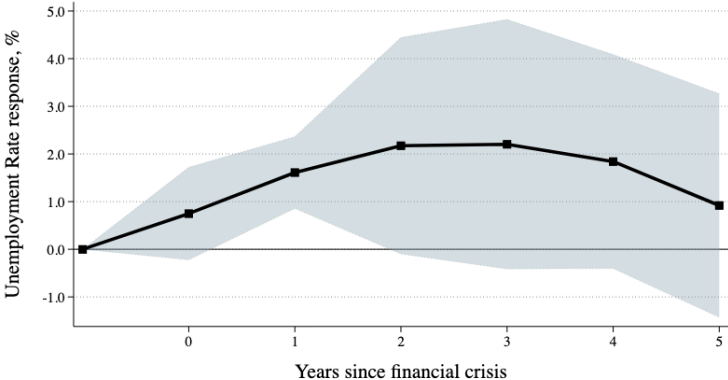
$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



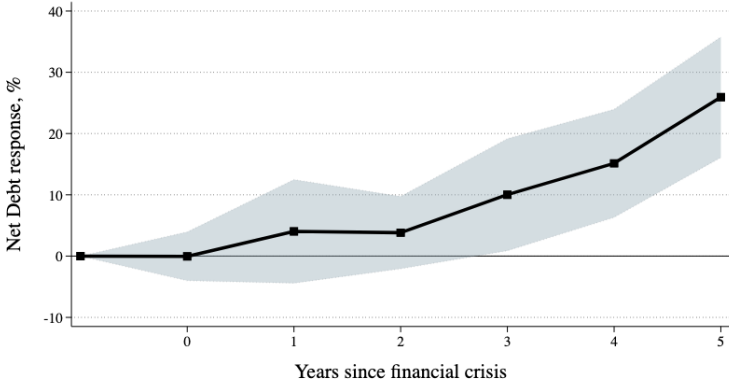
Other outcomes

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$

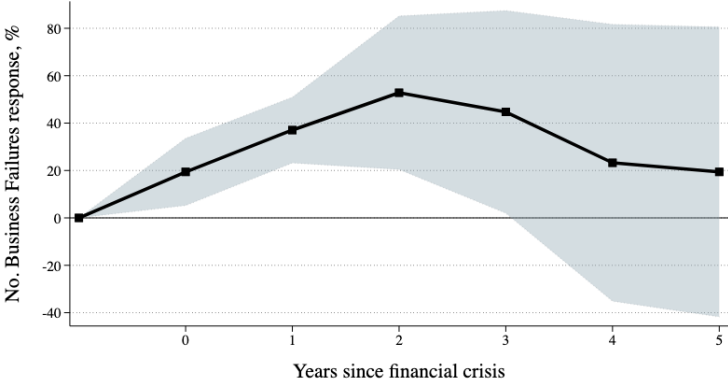
(a) Unemployment Rate



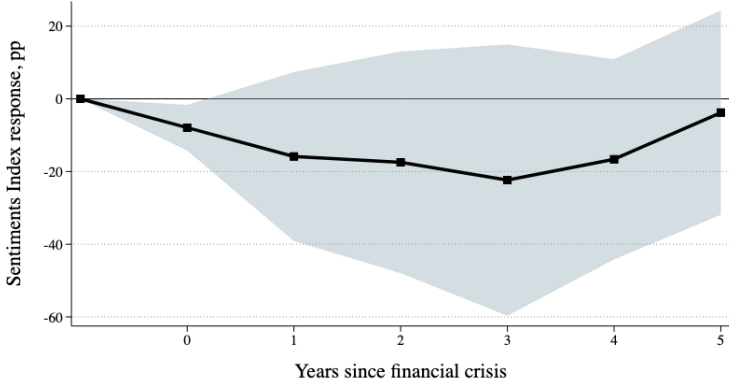
(b) Net State Debt



(c) Number of Business Failures

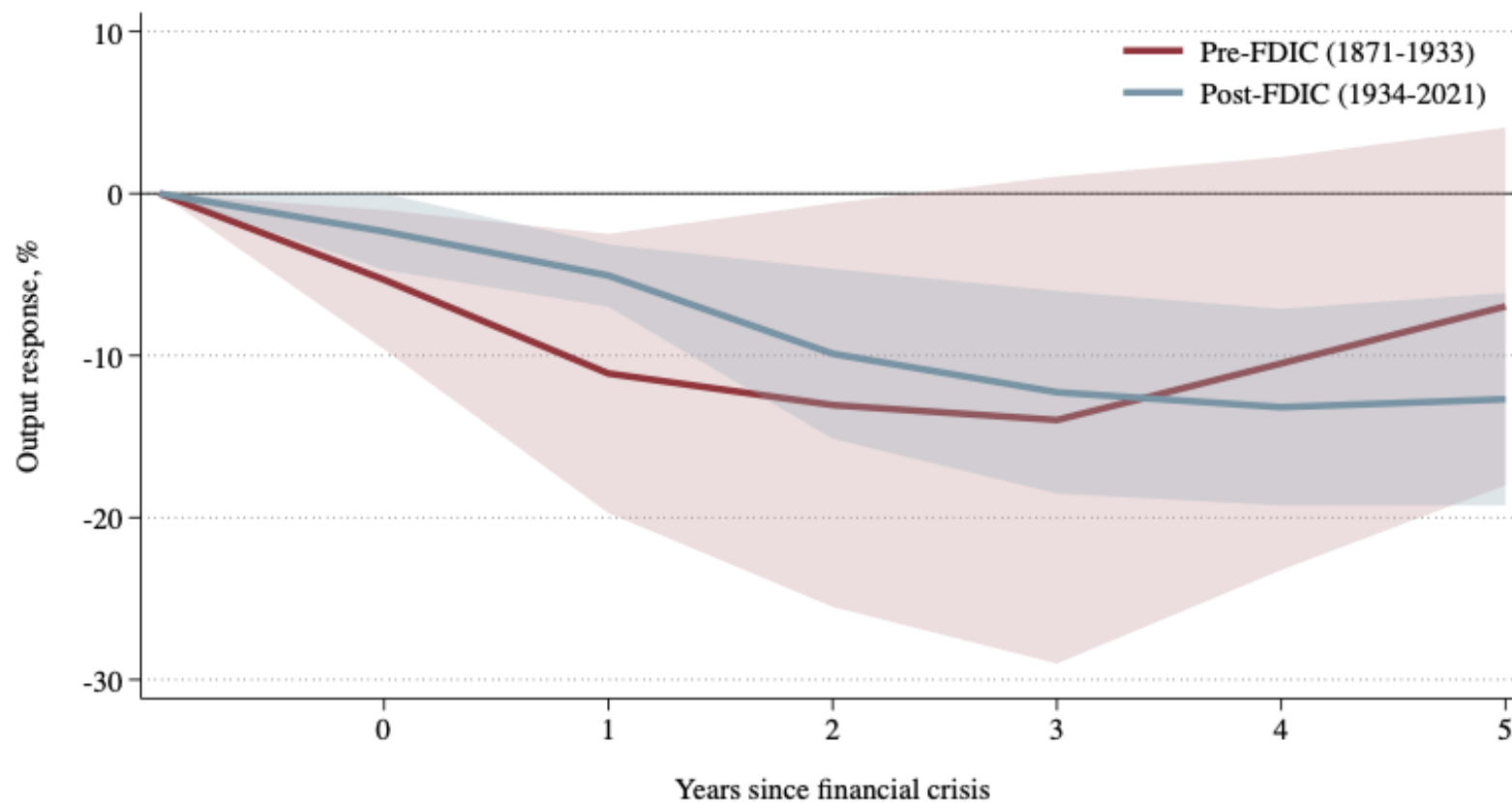


(d) Economic Sentiment Index



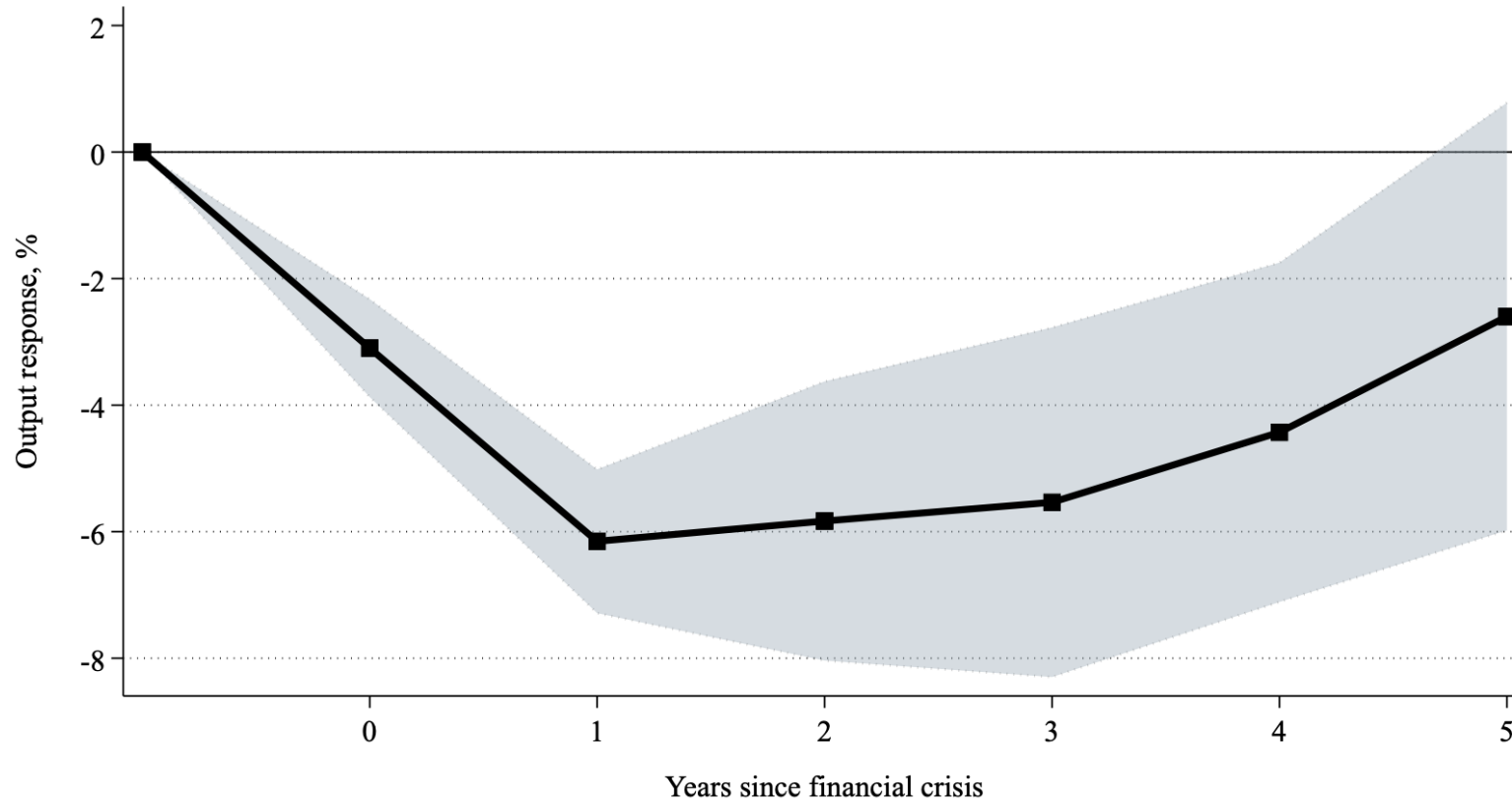
Subsamples

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



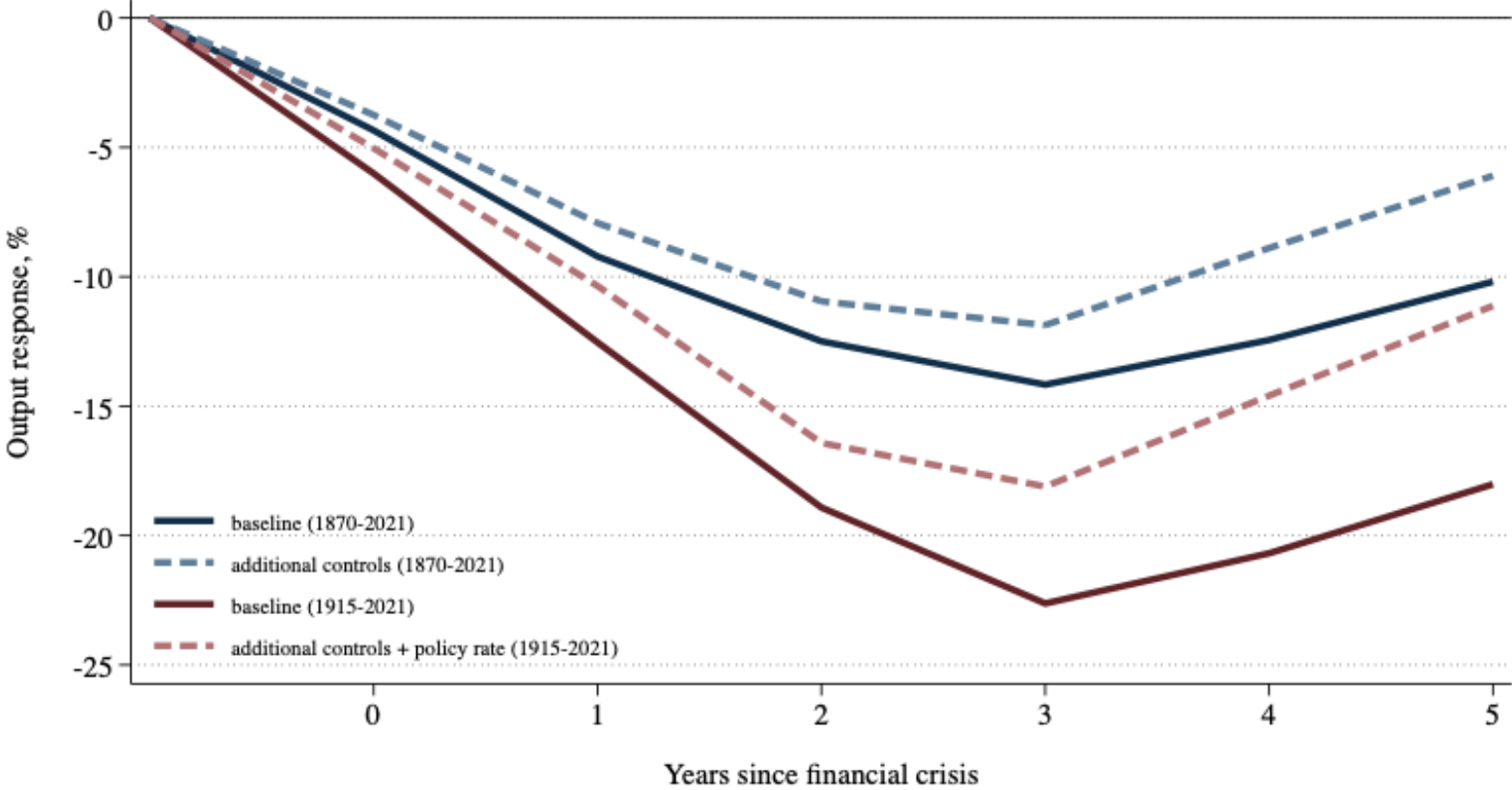
Subsamples: Without Depression & GFC

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



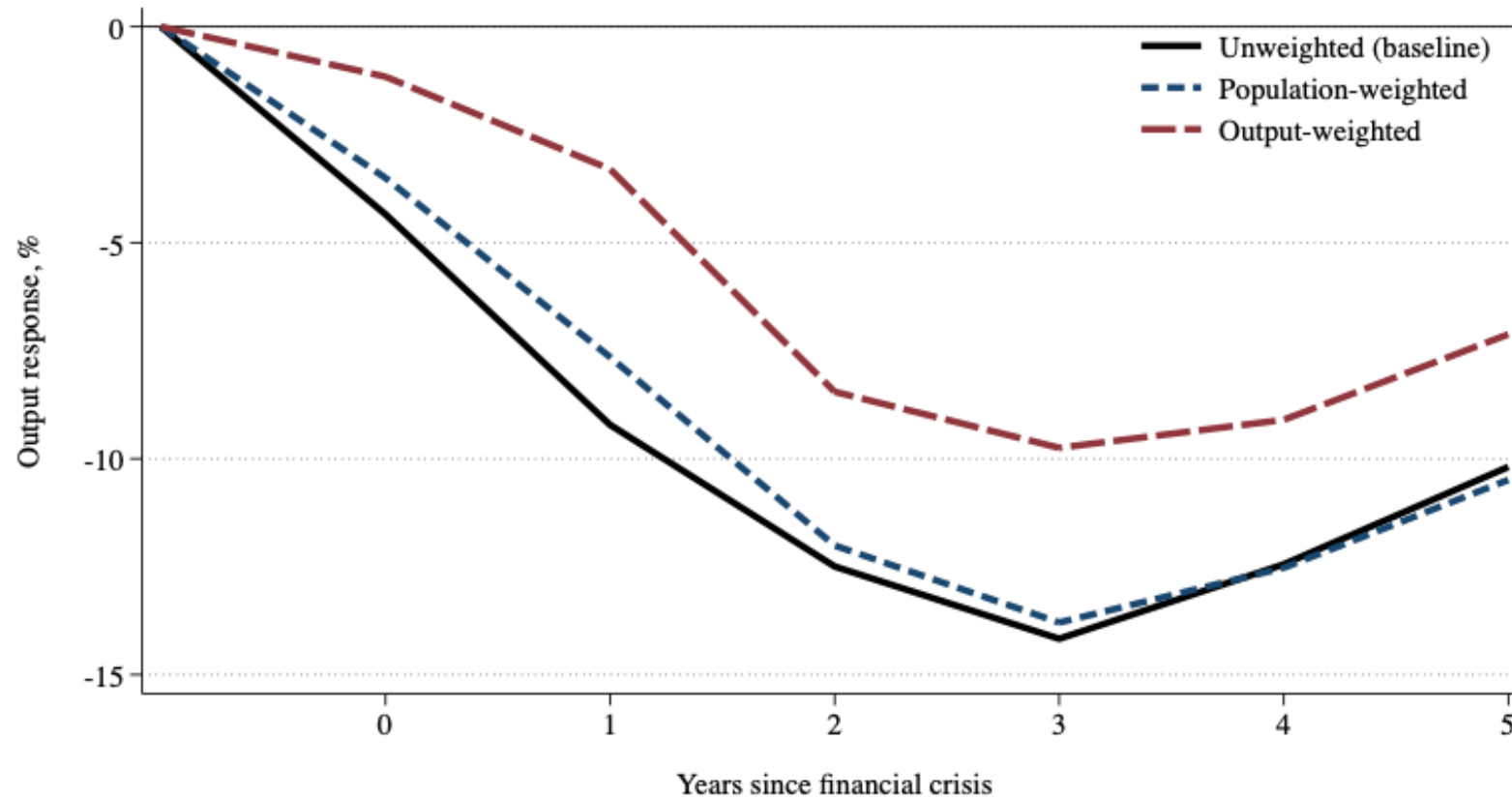
More controls

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



WLS

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$

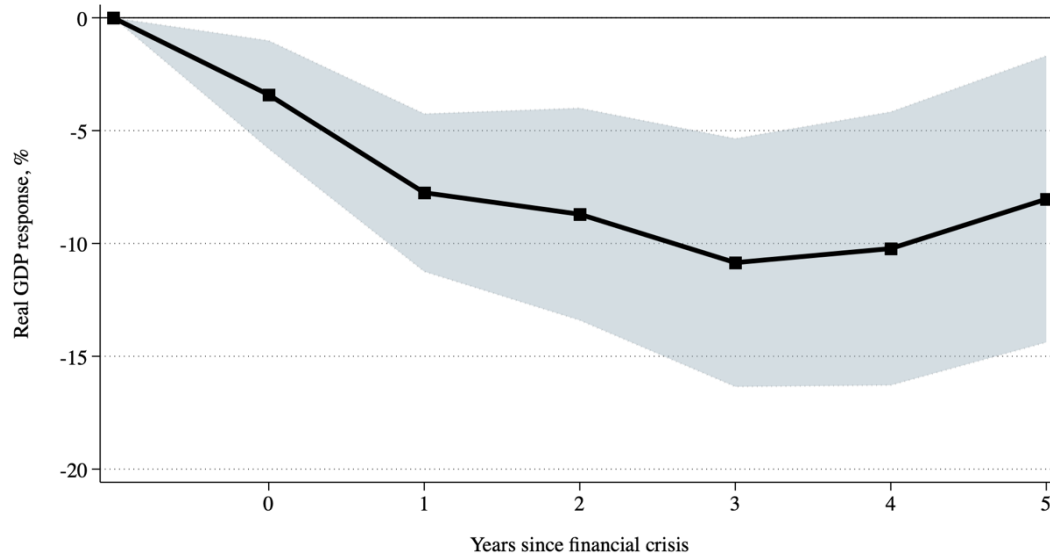


Time series results, 1790-2022

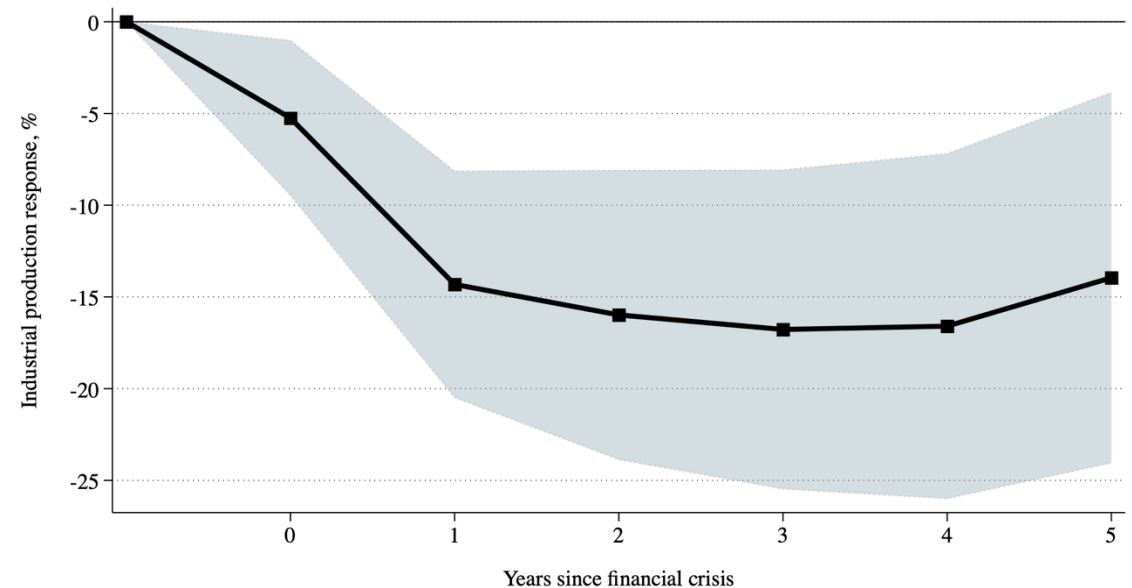
Impulse responses from time series LPs larger than state-level results

$$\Delta Y_{t+h} = \alpha^h + \beta^h \mathbf{1}_t^{U.S. \text{ crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{t-k} + \varepsilon_t^h$$

(a) US GDP



(b) Industrial production

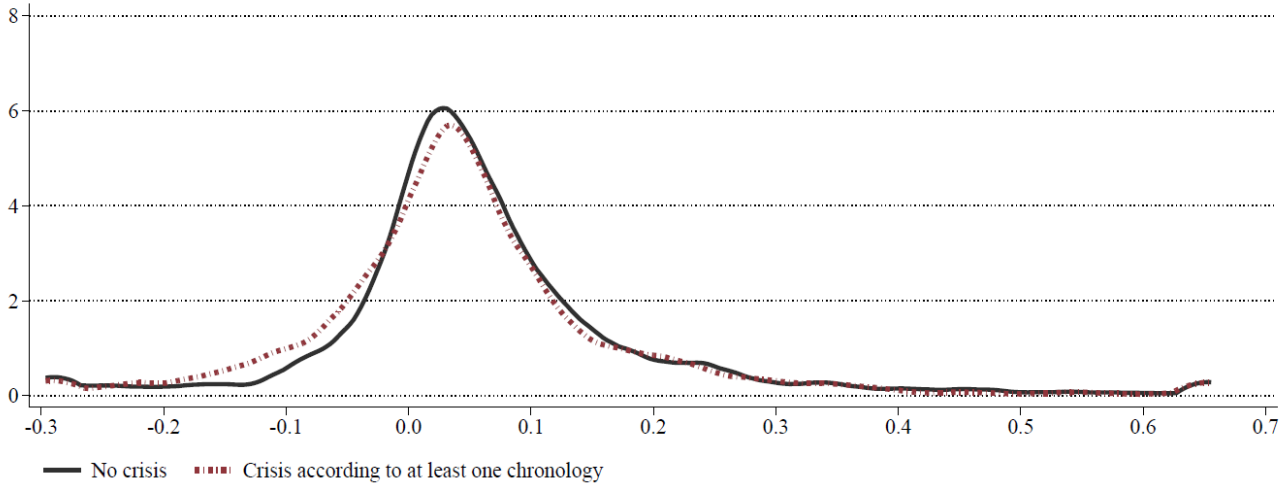


Notes: Confidence intervals based on Newey-West standard errors. We include 5 lags of the dependent variable.

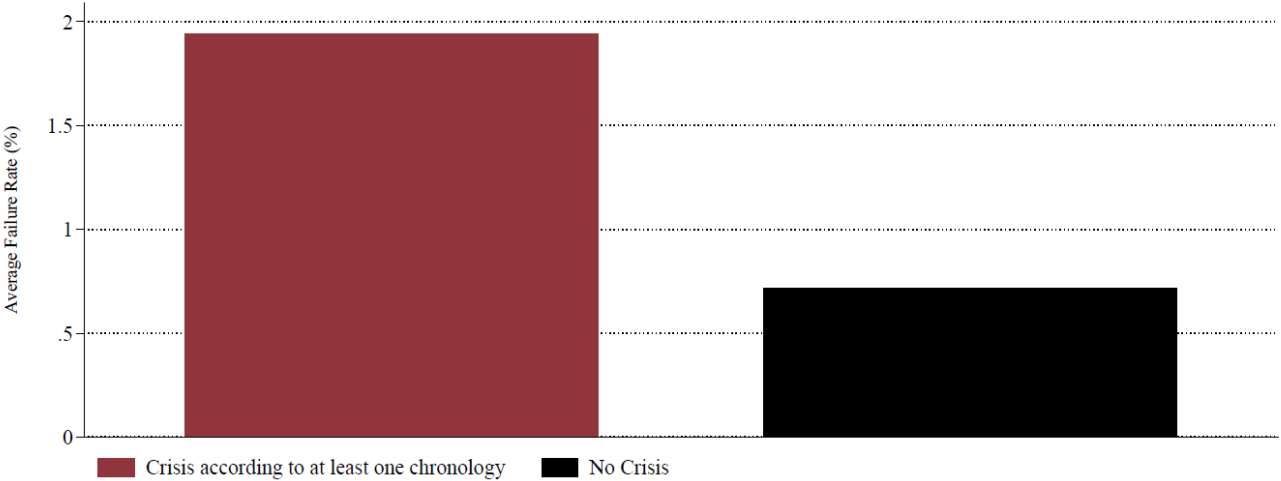
Data sources: GDP: BEA and Williamson (2024); Industrial production: Federal Reserve, Miron and Romer (1990), Davis (2004). [◀ Back](#)

Distribution of banking sector distress during crises

(a) Deposit Growth



(c) Bank Failure Rate





Supplementary slides

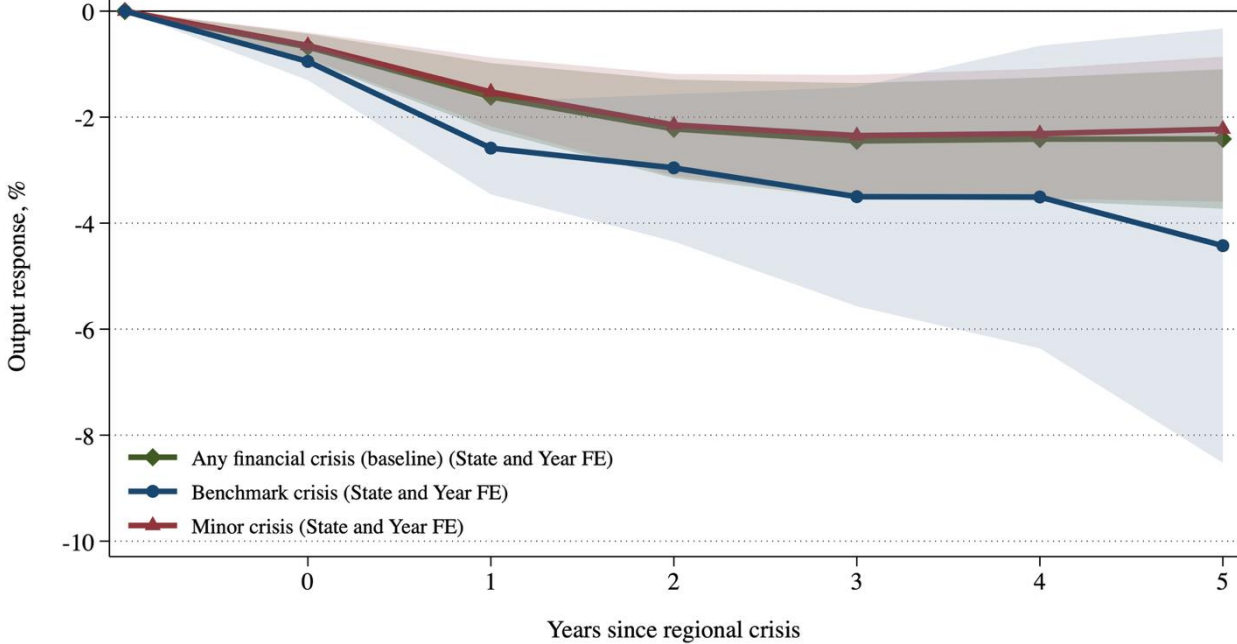
Regional crisis results



Regional banking distress outside of systemic crises

Output losses of 2% when distress occurs in years other than major systemic crises

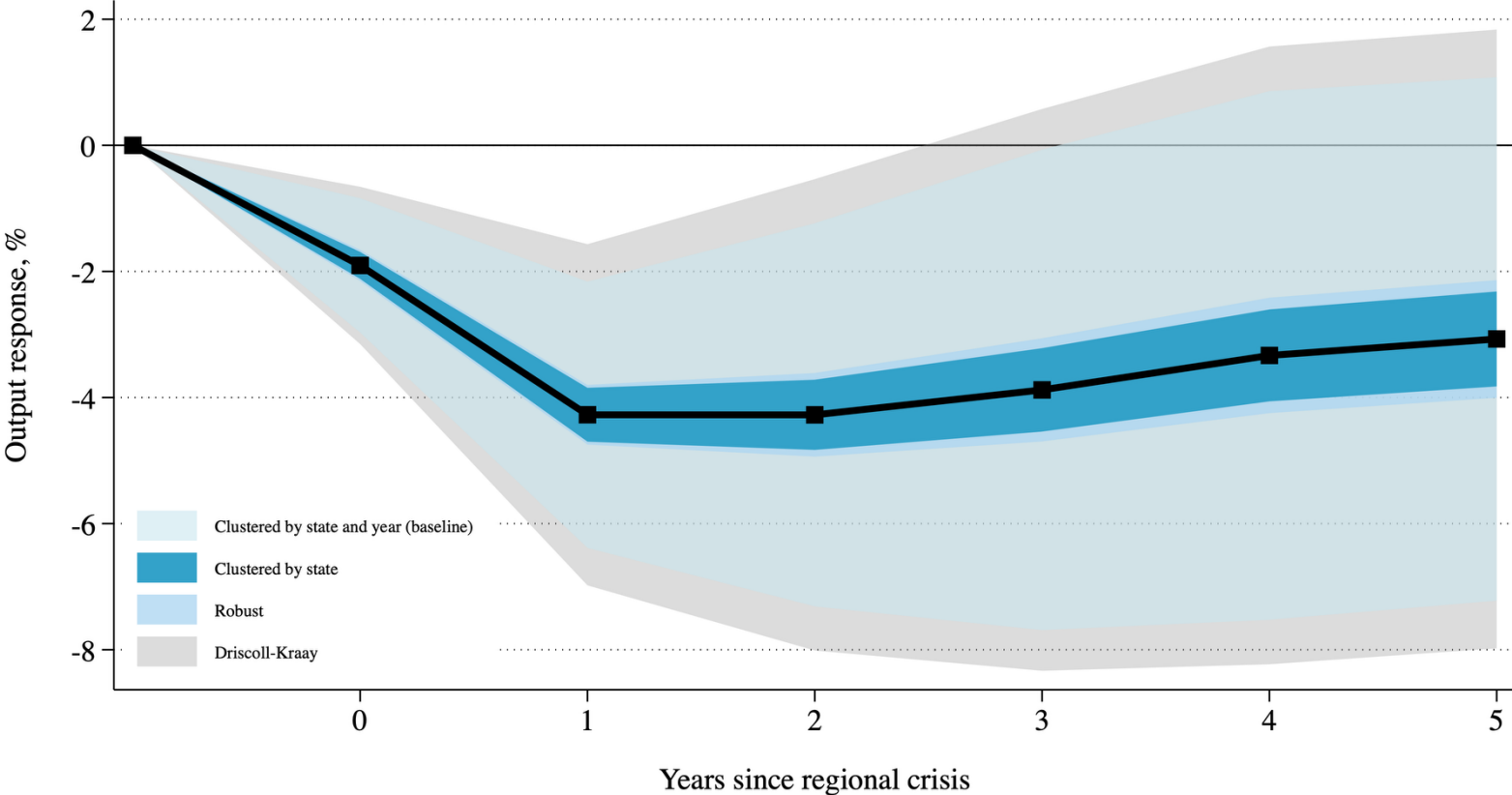
$$\Delta Y_{i,t+h} = \alpha_i^h + \alpha_t^h + \beta^h \mathbf{1}_{it}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



Notes: We use three definitions of local distress. All three require the same state-level statistical evidence, but vary the required narrative evidence: (a) any financial crisis, our baseline list of “potential crises”, (b) major financial crises in the benchmark list, or (c) minor, non-benchmark crises.

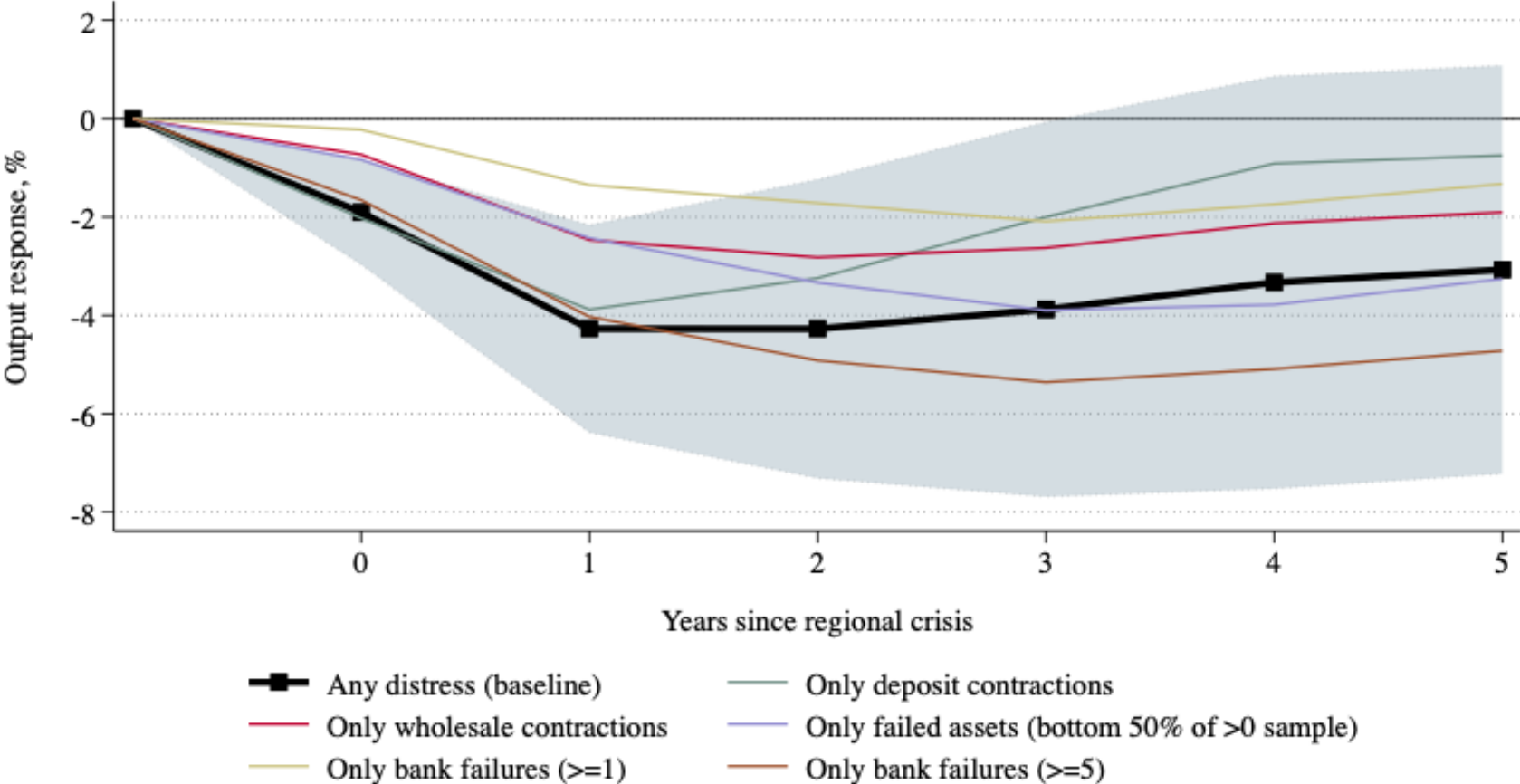
Standard errors

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



By type of distress

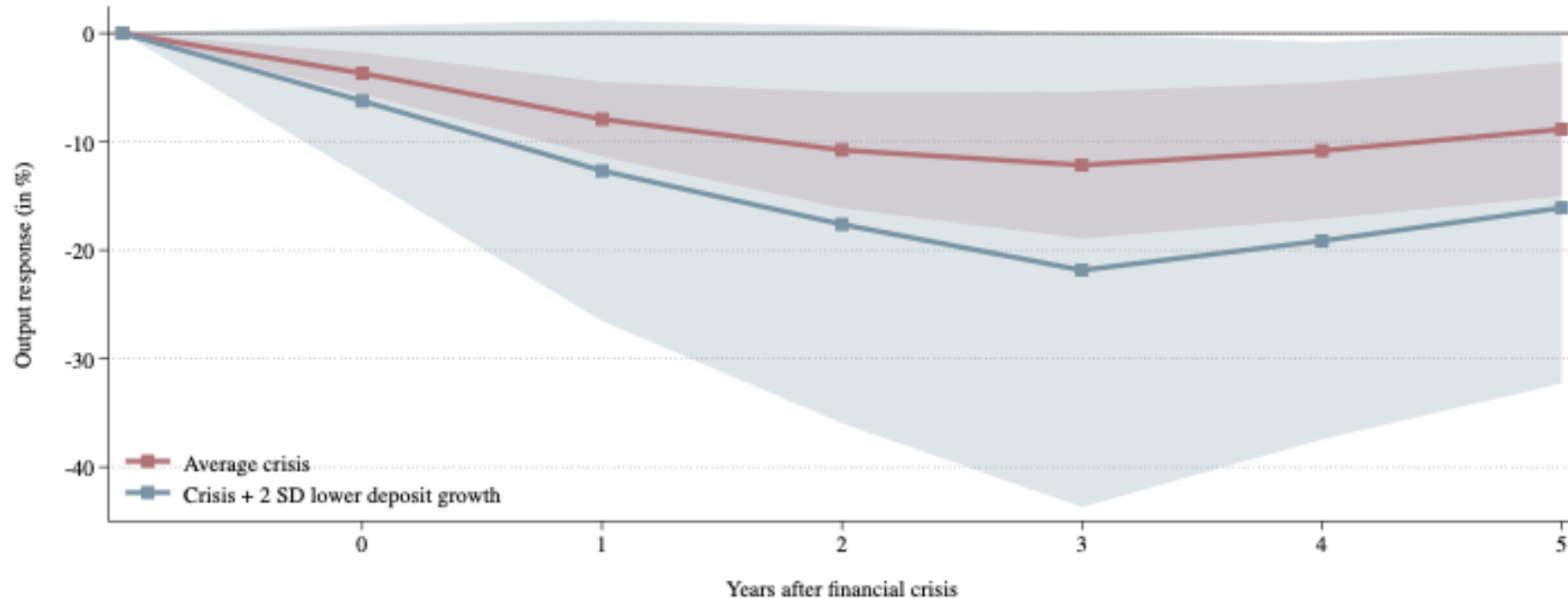
$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



Specification with interaction

A specification with interaction term yields qualitatively similar results to a local distress dummy

$$\Delta Y_{i,t+h} = \alpha_i^h + \beta_1^h \mathbf{1}_t^{U.S. \text{ crisis}} + \beta_2^h \Delta \text{Deposits}_{i,t} + \beta_3^h \mathbf{1}_t^{U.S. \text{ crisis}} \times \Delta \text{Deposits}_{i,t} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$

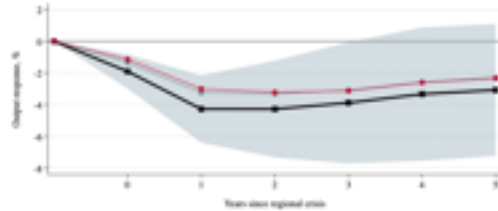


Notes: Qualitatively similar results for bank failures or wholesale liabilities. See paper.

Alternative specifications

Changing nature of crises

$$\Delta Y_{it+h} = \alpha_0^h + \beta^h \mathbf{1}_{it}^{\text{local distress}} + \sum_{k=1}^5 \gamma^{h,k} \Delta X_{it-k} + \varepsilon_{it}^h$$

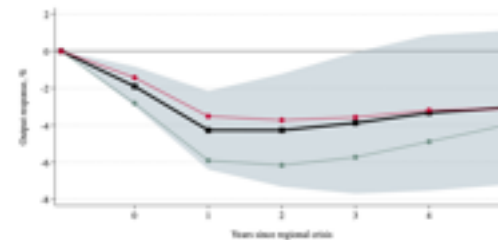


- Deposit contractions as wholesale liability contractions, and bank failures (FDIC)
- Deposit as wholesale liability contractions (post FDIC), bank failures (post FDIC)
- Deposit contractions as failures (post FDIC), wholesale liability contractions as failures (post FDIC)

◀ Back

Horizon relative to crisis

$$\Delta Y_{it+h} = \alpha_0^h + \beta^h \mathbf{1}_{it}^{\text{local distress}} + \sum_{k=1}^5 \gamma^{h,k} \Delta X_{it-k} + \varepsilon_{it}^h$$

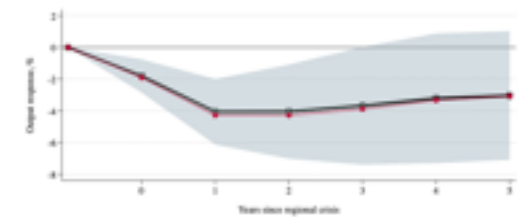


- Distress within 1 year (baseline)
- Distress in the crisis year
- Distress within 2 years

◀ Back

Add state and savings banks

$$\Delta Y_{it+h} = \alpha_0^h + \beta^h \mathbf{1}_{it}^{\text{local distress}} + \sum_{k=1}^5 \gamma^{h,k} \Delta X_{it-k} + \varepsilon_{it}^h$$

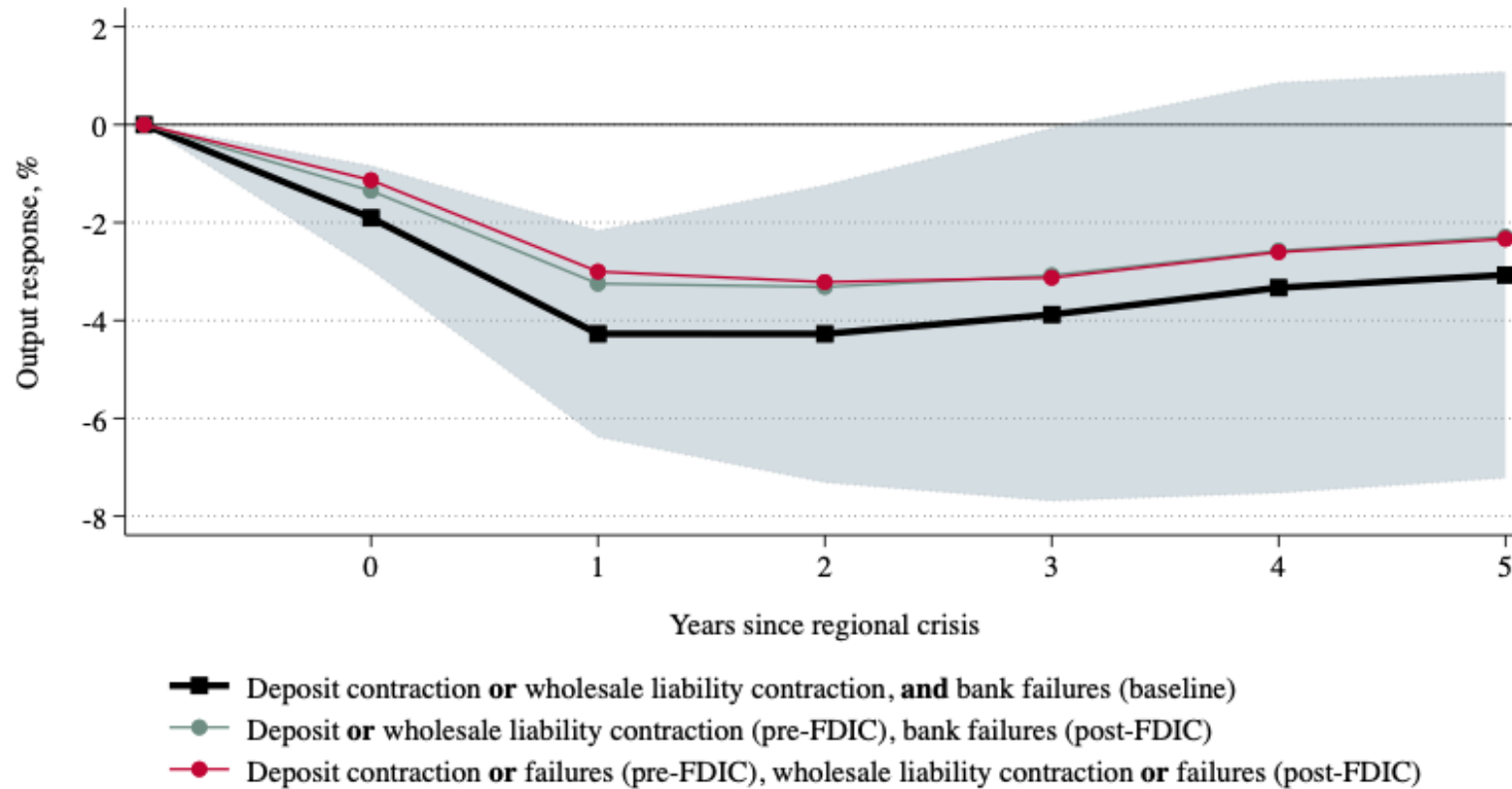


- National banks (baseline)
- National and state banks
- National banks, state banks, savings banks

◀ Back

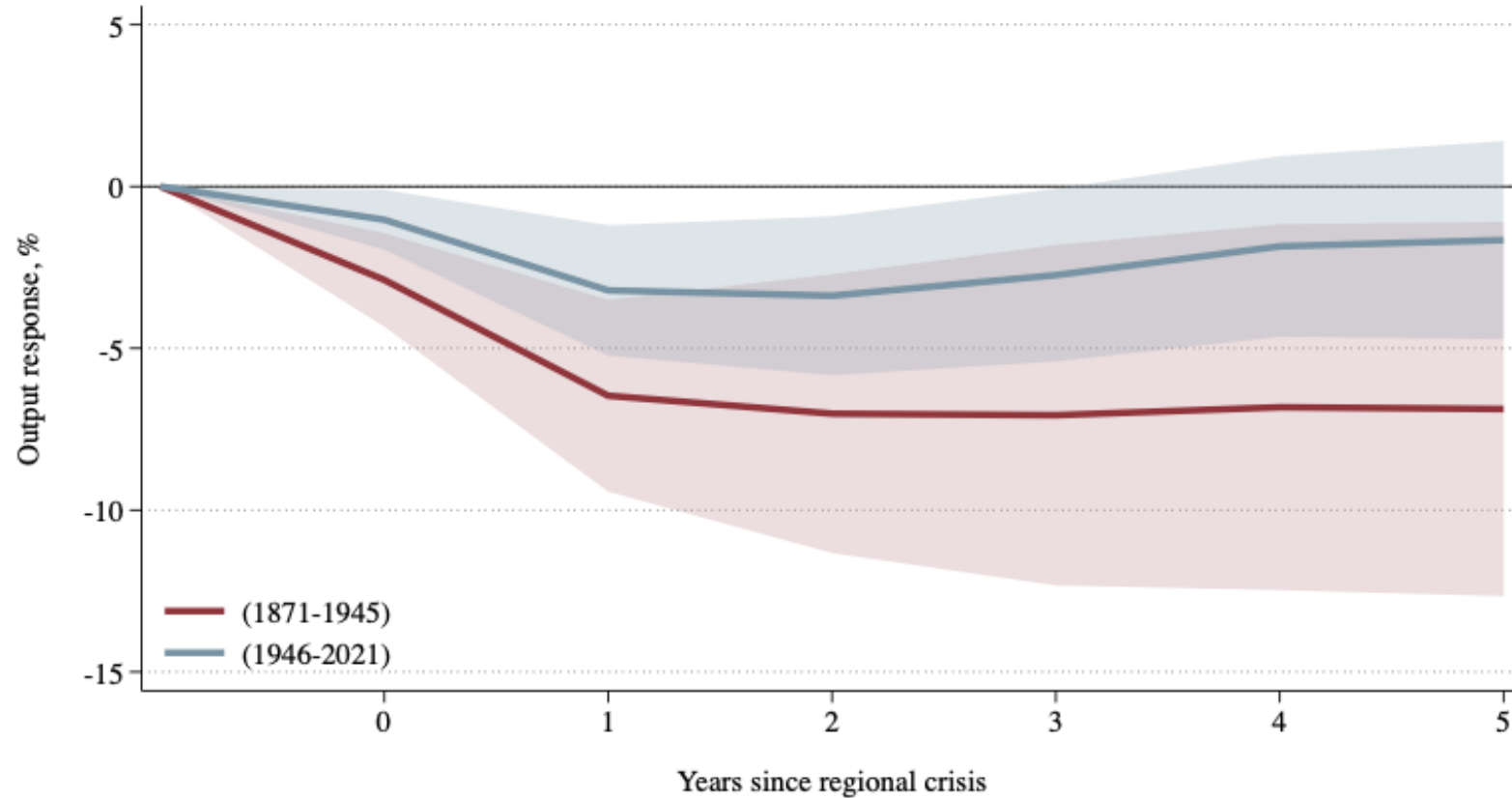
Changing nature of crises

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



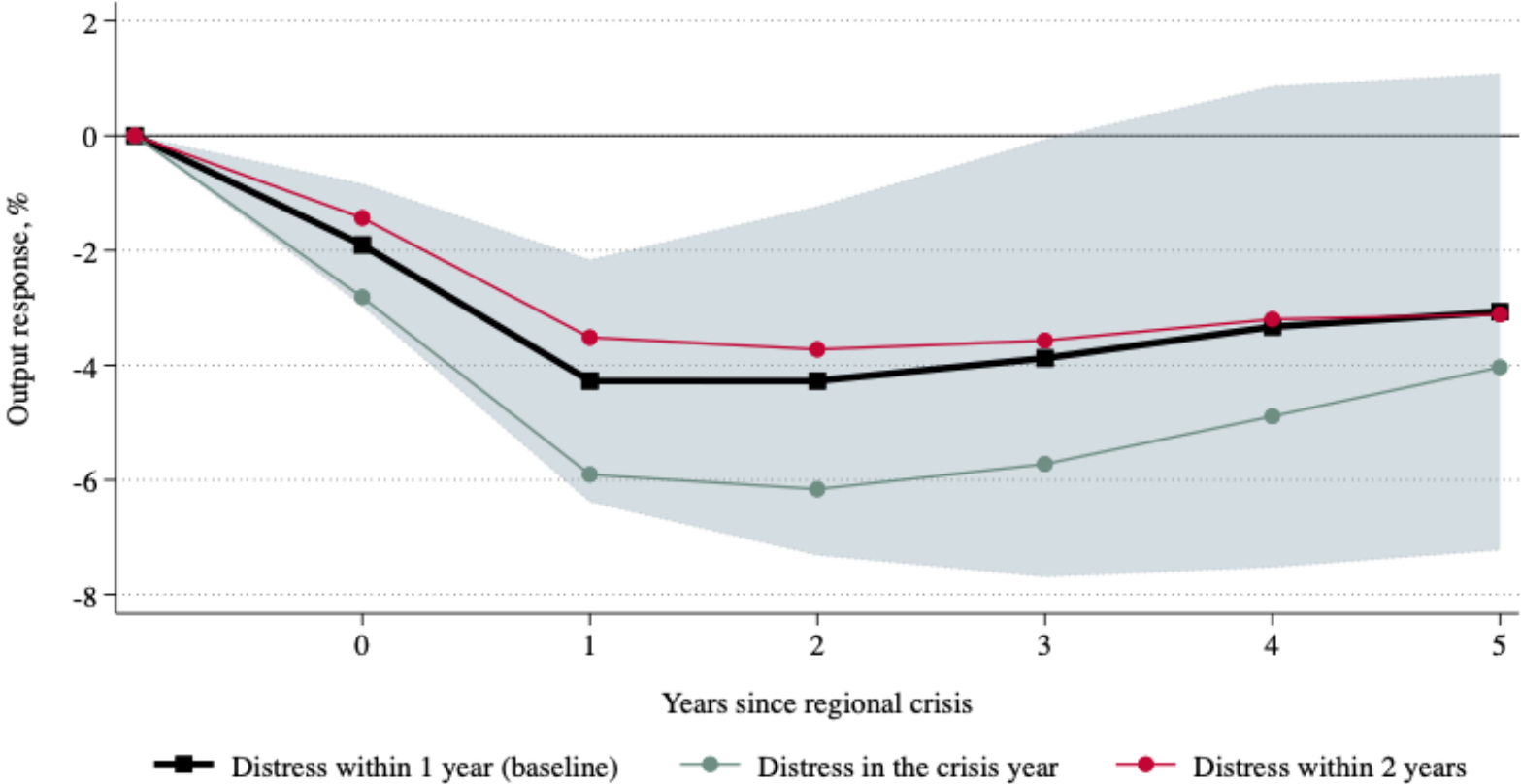
Sample split

$$\Delta Y_{i,t+h} = \alpha_i^h + \beta^h \mathbf{1}_{i,t}^{\text{Regional crisis}} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{i,t-k} + \varepsilon_{i,t}^h$$



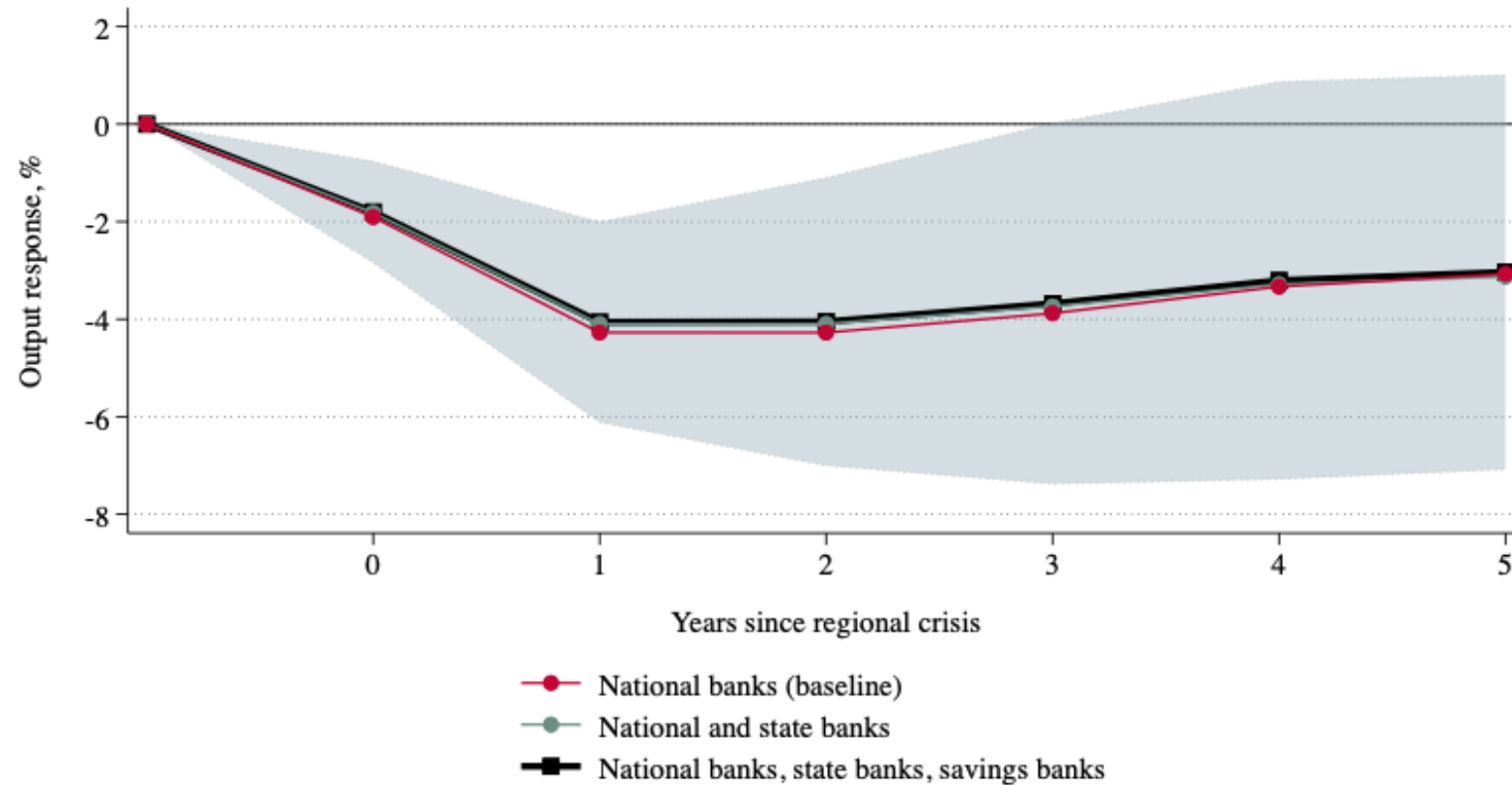
Horizon relative to crisis

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



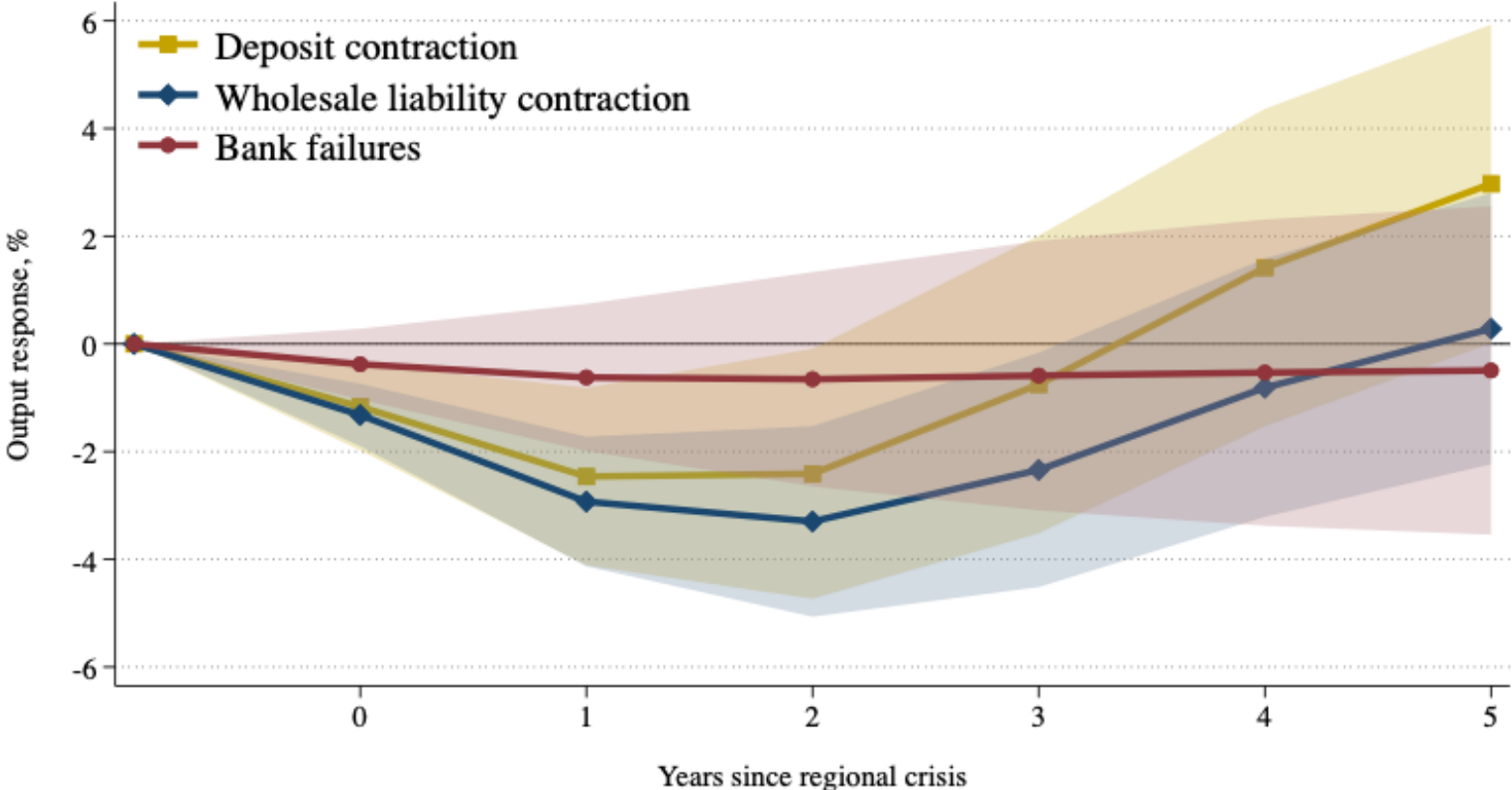
Add state and savings banks

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



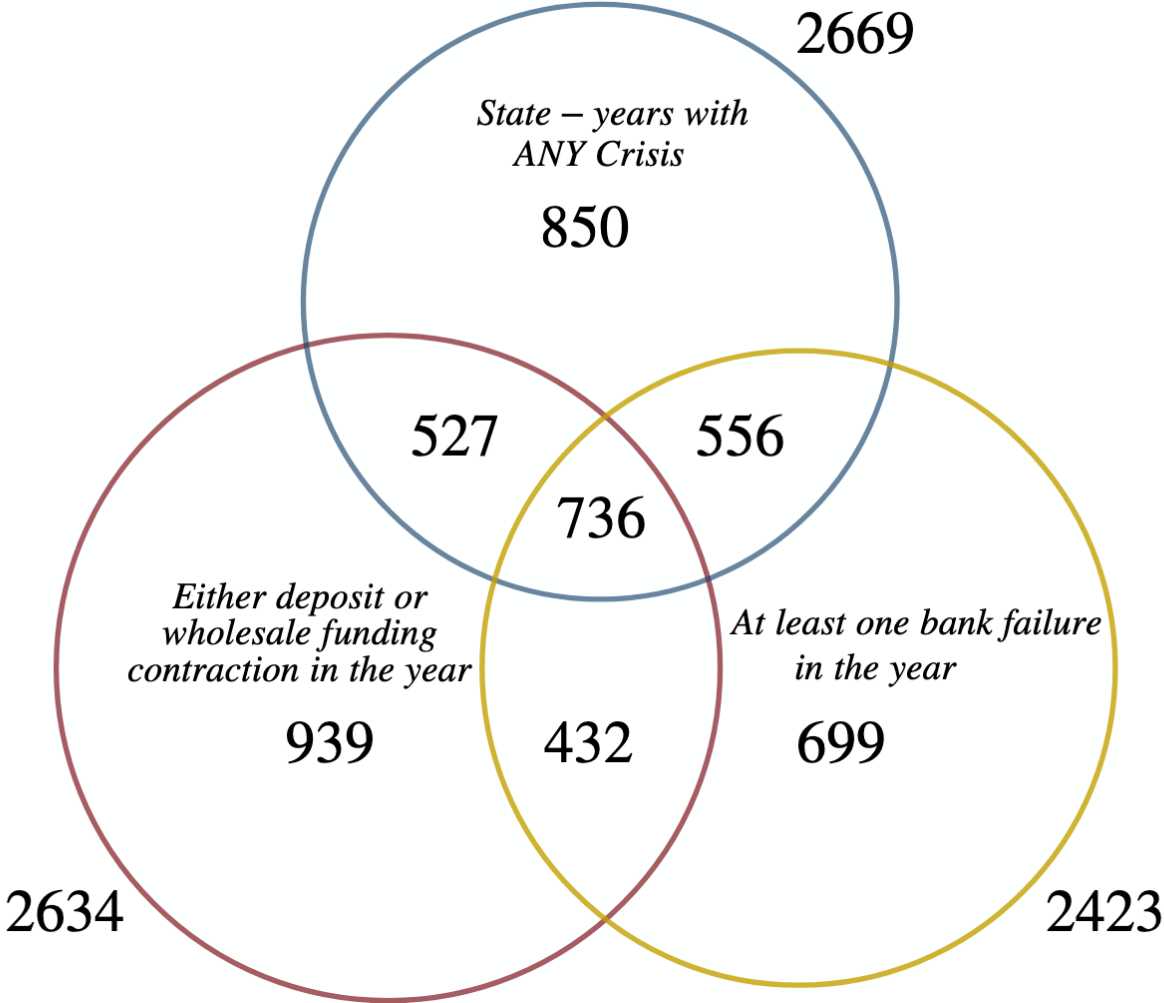
Definition without narratives

$$\Delta Y_{st+h} = \alpha_s^h + \beta^h \mathbf{1}_{st}^{Local\ distress} + \sum_{k=1}^5 \gamma^{k,h} \Delta \mathbf{X}_{st-k} + \varepsilon_{st}^h$$



Breakdown of Crises over States and Years

Total State-Year Observations: 6501 (for 48 states from 1870 to 2021)





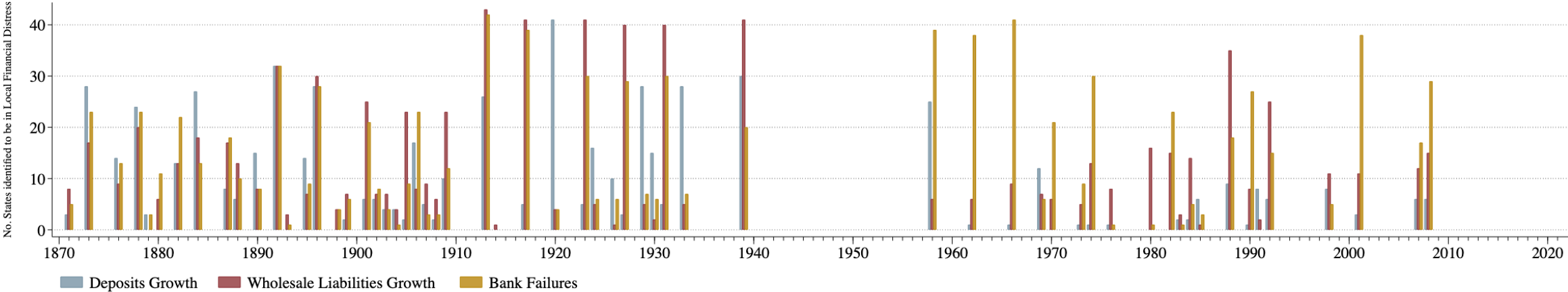
Supplementary slides

Regional crisis chronology



Changes over time

Distress defined only based on deposits, wholesale liabilities, and bank failures



Notes: Local financial distress is a state-year indicator variable equal to 1 if:
(a) there is a U.S. financial crisis according to any chronology (~1/3 of years), and
(b) there is state-level statistical evidence for poor bank health (deposit or wholesale liability contraction or bank failures).

Validation

Our regional crisis measure overlaps with the limited existing narrative evidence

State	Year	Narrative evidence			Distress classification		
		Jalil	Davison-Ramirez	Metrick-Schmelzing	Baseline	Broad	Narrow
Alabama	1929	No	Yes	No	Yes	Yes	Yes
Florida	1926	Yes	Yes	No	Yes	Yes	No
	1927	Yes	Yes	No	Yes	Yes	Yes
	1929	Yes	Yes	Yes	Yes	Yes	Yes
Georgia	1926	Yes	Yes	No	Yes	Yes	No
Iowa	1926	No	Yes	No	Yes	Yes	Yes
Illinois	1896	Yes	No	No	Yes	Yes	No
	1905	Yes	No	Yes	No	Yes	No
	1929	No	Yes	No	Yes	Yes	Yes
	1932	No	No	Yes	Yes	Yes	Yes
Indiana	1929	No	Yes	No	Yes	Yes	No
Kansas	1927	No	Yes	No	Yes	Yes	No
Massachusetts	1899	Yes	No	No	Yes	Yes	Yes
	1920	Yes	No	No	Yes	Yes	Yes
	1991	No	No	Yes	Yes	Yes	Yes
Maryland	1903	Yes	No	No	No	Yes	No
Minnesota	1896	Yes	No	No	Yes	Yes	No
	1923	No	Yes	No	Yes	Yes	No
Missouri	1926	No	Yes	No	Yes	Yes	No
North Dakota	1920	Yes	No	Yes	Yes	Yes	Yes
Nebraska	1984	No	No	Yes	Yes	Yes	No
New Jersey	1884	Yes	No	No	Yes	Yes	Yes
New Mexico	1924	No	Yes	No	Yes	Yes	Yes
New York	1871	No	No	Yes	No	Yes	No
	1873	Yes	No	No	Yes	Yes	Yes
	1884	Yes	No	No	Yes	Yes	Yes
	1890	Yes	No	No	Yes	Yes	Yes
	1899	Yes	No	No	Yes	Yes	Yes
	1901	Yes	No	No	No	Yes	No
	1907	Yes	No	Yes	Yes	Yes	No
1908	Yes	No	No	No	Yes	No	
Ohio	1985	No	No	Yes	No	Yes	No
Oklahoma	1909	No	No	Yes	No	Yes	No
Pennsylvania	1873	Yes	No	No	No	Yes	No
	1884	Yes	No	No	Yes	Yes	Yes
	1903	Yes	No	No	No	Yes	No
South Dakota	1924	No	Yes	No	Yes	Yes	Yes
	1926	No	Yes	No	Yes	Yes	Yes
Wisconsin	1896	Yes	No	No	Yes	Yes	No

Excerpt

State	Year	Deposits (pct. growth)	Wholesale liabilities (pct. growth)	Bank failures
California	1888	-19.1	2.6	3
	1892	-5.5	-10.6	1
	1893	-27.5	-12	3
	1907	-15.3	-37.5	6
	1913	5.3	-0.9	1
	1914	5.5	-22.7	4
	1917	22.7	-4.2	7
	1920	-3.2	-22.7	10
	1923	8.3	-1.7	19
	1924	-5.9	-5.5	17
	1931	8	-21.9	19
	1932	-16.8	-35.5	23
	1933	-1.9	-16.7	12
	1983	6	-5.7	5
	1984	3.8	-68	6
	1985	-17	-5.3	7
	1990	7.8	-5.4	4
1991	1.7	-15.9	4	
1992	-1.3	-14.3	12	



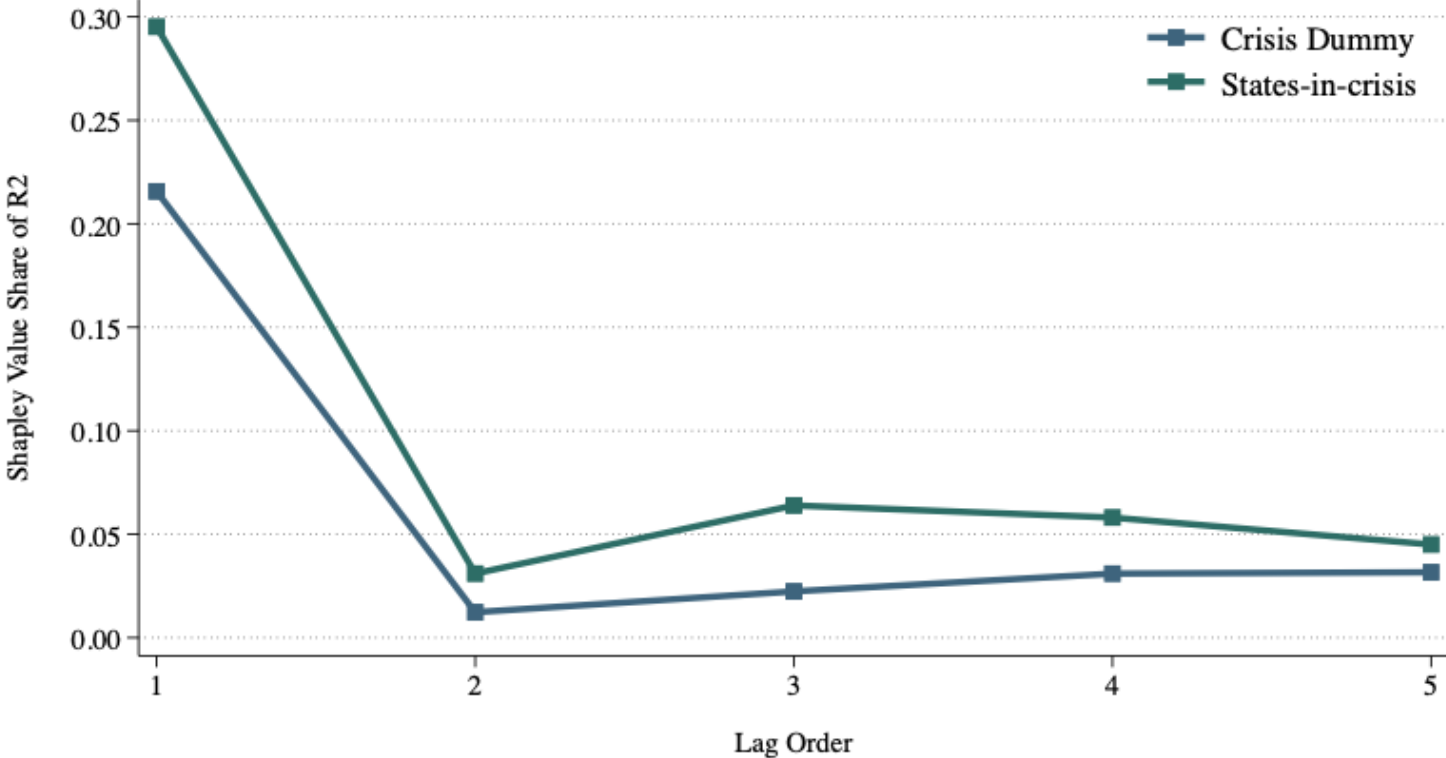
Supplementary slides

States-in-crisis



States-in-crisis explains a larger share of variation than a traditional crisis dummy

Fraction of states experiencing regional crisis predicts output beyond national crisis dummy



Notes: We compute the shares using a Shapley decomposition of the R-squared from a regression of U.S. GDP growth on the states-in-crisis measure and our benchmark crisis dummy L years before realization, as well as 5 lags of U.S. GDP growth.

Roadmap

1 A Historical State-Level Macro-Financial Dataset, 1863-2023

2 Classifying U.S. Financial Crises

3 The Output Losses of U.S. Financial Crises

4 The Aftermath of Regional Crises

5 States-in-Crisis and U.S.-Wide Recessions

A continuous measure of financial distress, 1863-2023

In cross-country data, output losses of crises are partly predictable using...

- Credit spreads, bank equity crashes, deposit growth rates
(Krishnamurthy & Muir, 2017; Baron, Verner, & Xiong, 2021; Jamilov, König, Müller, & Saidi, 2024)
- Narrative evidence or NLP methods based on textual data
(Romer & Romer, 2017; Shen et al., 2021; Ahir et al., 2023)

In the U.S., many efforts to quantify financial stress

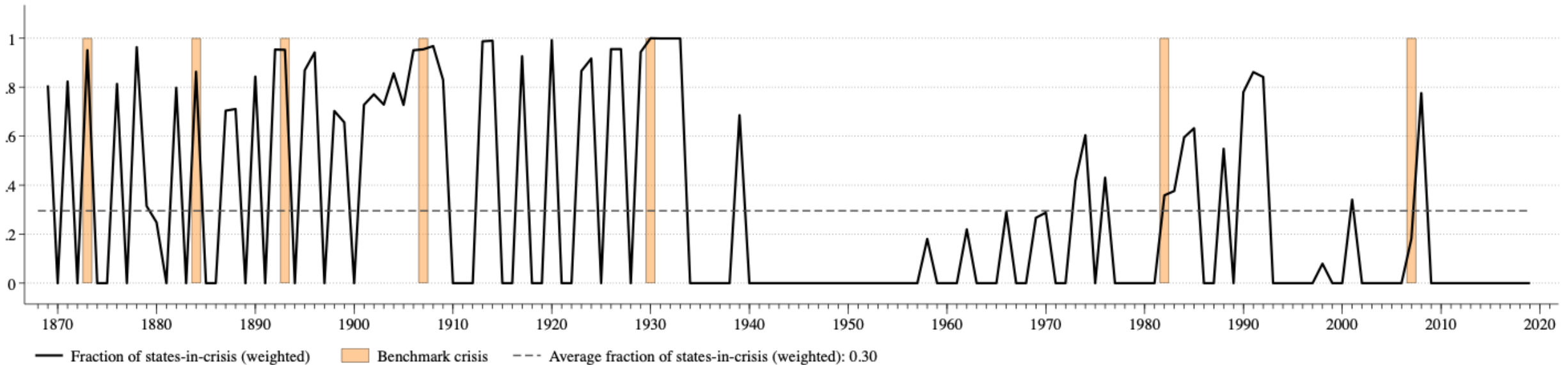
- Policy makers: Financial Stress Indexes by OFR, Kansas City Fed, St. Louis Fed
- Academic work: Delong and Summers (1986) and Bordo, Dueker, and Wheelock (2000)

Our contribution: regional variation → states-in-crisis

- Measures the fraction of states experiencing regional crisis (weighted by bank assets)

The fraction of states experiencing regional crises

States-in-crisis measure measures the intensity of distress in a given year



Notes: States-in-crisis is defined as the share of U.S. banking sector assets experiencing a regional financial crises.

Regional crisis is a state-year indicator variable equal to 1 if:

- (a) there is a U.S. financial crisis according to any chronology (~1/3 of years), and
- (b) there is state-level statistical evidence for poor bank health (deposit or wholesale liability contraction or bank failures).

States-in-crisis predicts lower GDP growth

Fraction of states experiencing regional crisis predicts output after including national crisis dummy

Dependent var.:	$100 \times \Delta \text{GDP}_t$			$100 \times \Delta \text{IP}_t$		
	(1)	(2)	(3)	(4)	(5)	(6)
$\mathbf{1}\{\text{BenchmarkCrisis}_{t-1}\}$	-5.210*		-4.105	-11.162***		-9.199***
	(2.737)		(2.660)	(3.482)		(3.418)
$\text{States-in-crisis}_{t-1}$		-1.256***	-1.092**		-2.129**	-1.697*
		(0.480)	(0.481)		(0.957)	(0.975)
AR(5)	Yes	Yes	Yes	Yes	Yes	Yes
Observations	147	147	147	147	147	147

Notes: The dependent variable is the log-change in GDP (columns 1-3) or industrial production (columns 4-6). Standard errors in parentheses are computed using 5 Newey-West lags. We control for five lags of the dependent variable. The sample covers 1870-2021.

Data sources: GDP: BEA and Williamson (2024); Industrial Production: Federal Reserve, Miron and Romer (1990), Davis (2004).