

LECTURE 2

The Effects of Monetary Changes: Narrative Evidence and Natural Experiments



August 29, 2018

I. INTRODUCTION AND THE “ST. LOUIS EQUATION”

A Strategy That Is Often a Useful Starting Point for Thinking about an Empirical Question

Think about:

- Would an OLS regression be a sensible way of trying to answer the question?
- If not, what possible problems would we be concerned about if we used OLS?

A Simple Model of the Determination of Some Macro Outcome

$$y_t = a + \sum_{i=0}^N b_i m_{t-i} + e_t,$$

where:

- y is some macroeconomic variable of interest;
- m is a measure of monetary developments;
- e is other influences on y ;
- N is the horizon over which m affects y .

Potential Problems with the St. Louis Equation?

- Endogenous policy causing correlation between e and the m 's.
- Developments in the private economy causing correlation between e and the m 's.

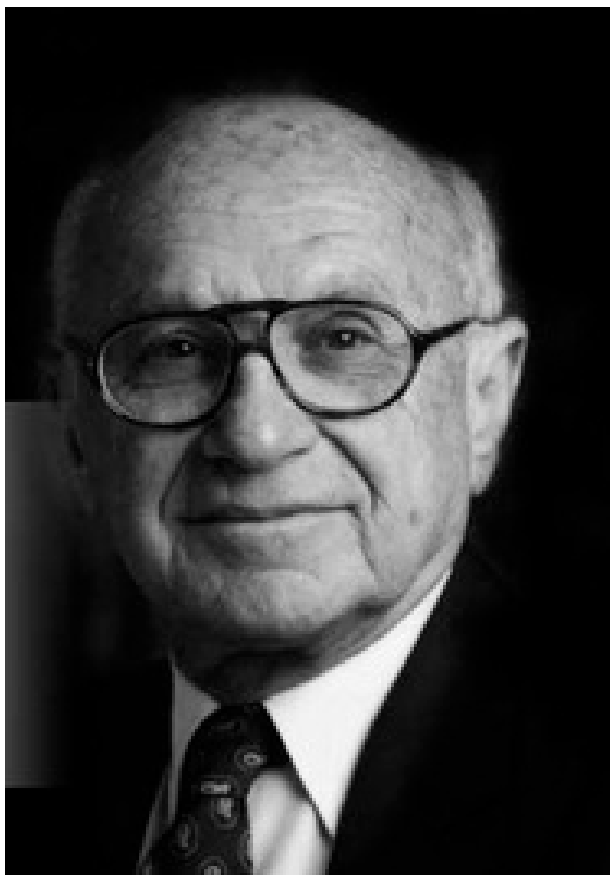
Two General Comments about Omitted-Variable Bias

- Think in terms of omitted-variable bias or correlation of right-hand side variables with the residual, not in terms of simultaneity or endogeneity.
- It's always good to think about what direction one expects bias in OLS to go.

II. MILTON FRIEDMAN AND ANNA SCHWARTZ: “A SUMMING UP”

“Narrative Analysis”

- Perhaps: The systematic use qualitative information from contemporary primary sources.
- In our context: The systematic use of qualitative information from contemporary primary sources *to address issues of causation*.



Milton Friedman (1912–2006)



Anna Jacobson Schwartz (1915–2012)

Friedman and Schwartz on the Value of Historical or Narrative Evidence

“The ... relation between changes in the stock of money and changes in other economic variables, alone, tells nothing about the origin of either or the direction of influence. ... A great merit of the examination of a wide range of qualitative evidence is that it proves a basis for discrimination between ... possible explanations of the observed statistical covariance. We can go beyond the numbers alone and, at least on some occasions, discern the antecedent circumstances whence arose the particular movements that become so anonymous when we feed the statistics into the computer.” (P. 686)

Friedman and Schwartz's 4 Crucial Experiments – The First Three

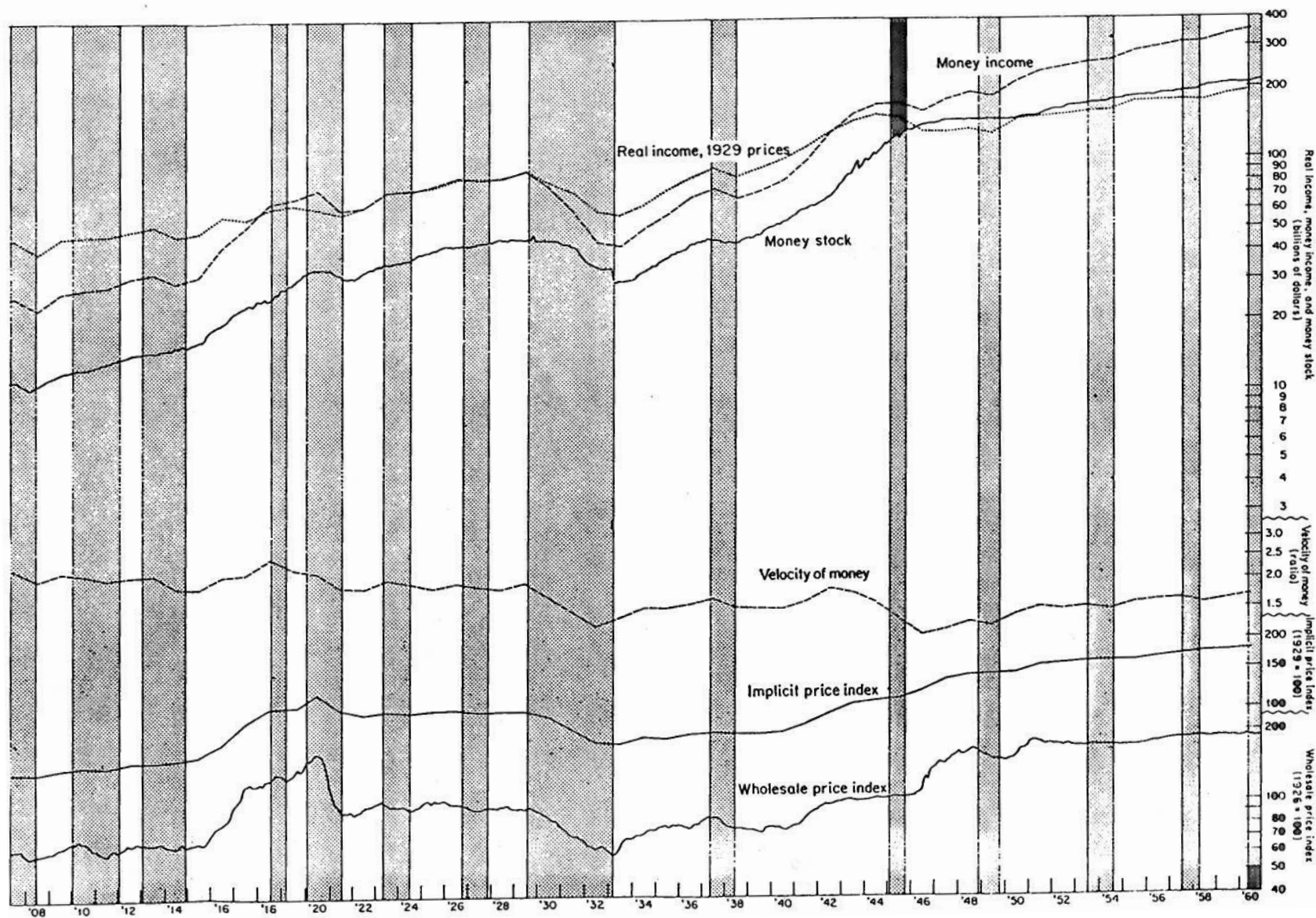
“Three counterparts of such crucial experiments stand out in the monetary record since the establishment of the Federal Reserve System. ... Like the crucial experiments of the physical scientist, the results are so consistent and sharp as to leave little doubt about their interpretation. The dates are [January–June 1920](#), [October 1931](#), and [July 1936–January 1937](#).” (P. 688)

Freidman and Schwartz's Fourth Crucial Experiment

“[T]he actions of the Reserve System in 1929–33 ..., even during the early phase of the contraction, from 1929 to 1931, when the decline in the stock of money was not the result of explicit restrictive measures taken by the System ... can indeed be regarded as a fourth crucial experiment” (p. 694).

CHART 62

Money Stock, Income, Prices, and Velocity, in Reference Cycle Expansions and Contractions, 1867 – 1960



Friedman and Schwartz's Strengths

- Understood the identification problem.
- Proposed a brilliant solution.
- Outstanding use of narrative sources.

Friedman and Schwartz's Weaknesses

- Definition of a monetary shock is vague.
- Selectivity.
- The movements in m aren't completely independent.
- No statistical tests.
- No analytic framework.

Measures to Minimize Judgment and Possible Bias in Narrative Analysis

- Delineating the universe of sources considered; laying out reasonably clear criteria for how one will approach the sources and what one is looking for; not revisiting an episode based on what was said about it later or what happened later.
- Documenting the reasons for one's conclusions from the narrative analysis.
- Not looking at outcome data or doing any statistical work until after doing the narrative analysis.

III. ROMER AND ROMER, “DOES MONETARY POLICY MATTER? A NEW TEST IN THE SPIRIT OF FRIEDMAN AND SCHWARTZ”

Romer and Romer (1989)

- Looked for times when the Federal Reserve decided the current inflation rate was too high, and was willing to accept a recession to bring it down.
- Possible advantages and disadvantages of this focus?

Romer and Romer's Key Dates

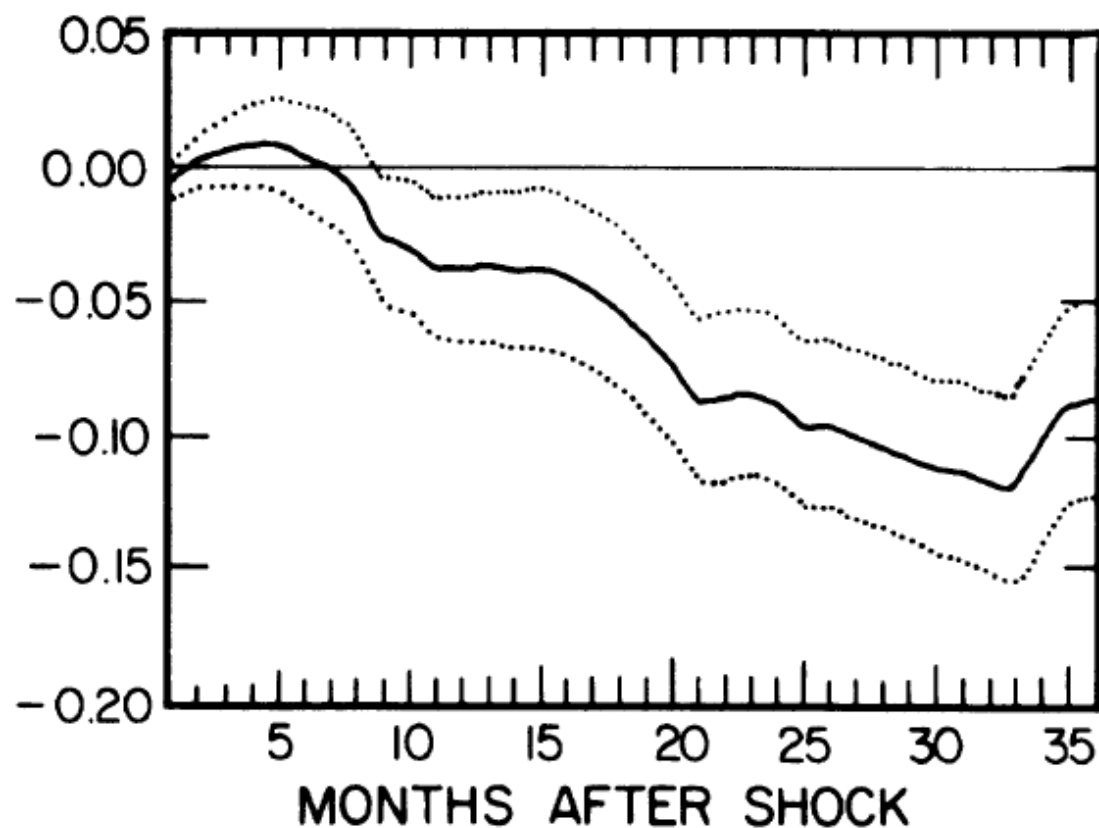
- October 1947
- September 1955
- December 1968
- April 1974
- August 1978
- October 1979
- (December 1988)

Romer and Romer's equation

$$y_t = a_0 + \sum_{i=1}^{11} a_i M_{it} + \sum_{j=1}^{24} b_j y_{t-j} + \sum_{k=0}^{36} c_k D_{t-k}$$

Romer and Romer (1989)

Figure 4 IMPULSE RESPONSE FUNCTION FOR BASIC INDUSTRIAL PRODUCTION REGRESSION



From: Romer and Romer, "Does Monetary Policy Matter?"

Evaluation and Discussion of Romer and Romer

Controlling for Oil Price Movements

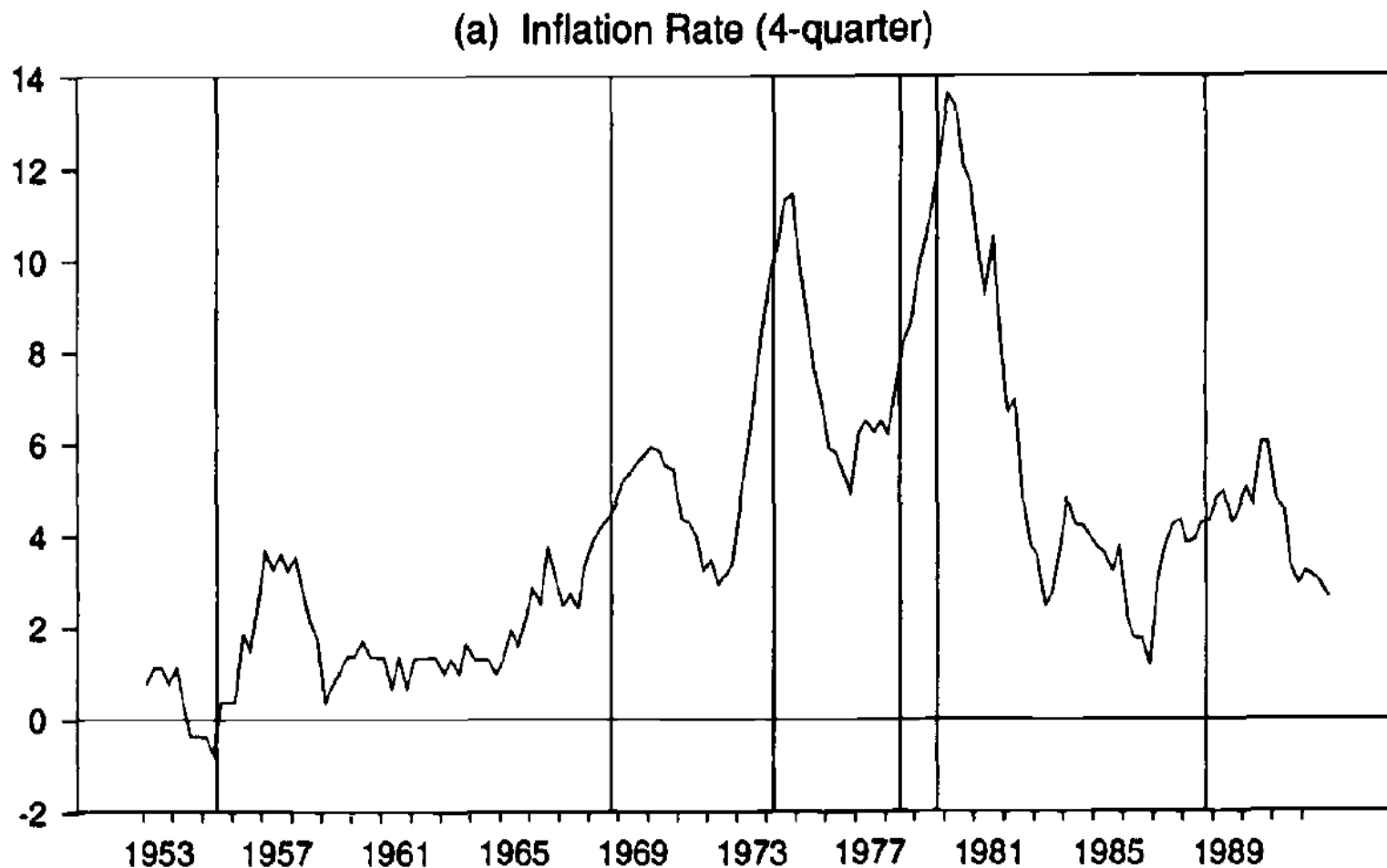
Table 2
Regressions through 1991

Oil shock measure	Estimated maximum impact of monetary shock	Standard error	<i>p</i> -value
None	– 11.4%	3.2%	0.0002
Hoover–Perez dummy variable	– 7.4	4.2	0.04
Calibrated Hoover–Perez dummy	– 10.0	3.6	0.003
% Δ (real price of oil)	– 10.5	4.2	0.006
% Δ (real price of oil) (+ and – entered separately)	– 9.6	4.3	0.01

The sample period is 1948:2 to 1991:12 for all regressions except those using oil prices, where the sample is 1950:2 to 1991:12 because of data limitations.

From: Romer and Romer, “Monetary Policy Matters”

Inflation after “Romer and Romer dates”



From: Matthew Shapiro, “Federal Reserve Policy: Cause and Effect”

IV. RICHARDSON AND TROOST: “MONETARY INTERVENTION MITIGATED BANKING PANICS DURING THE GREAT DEPRESSION”

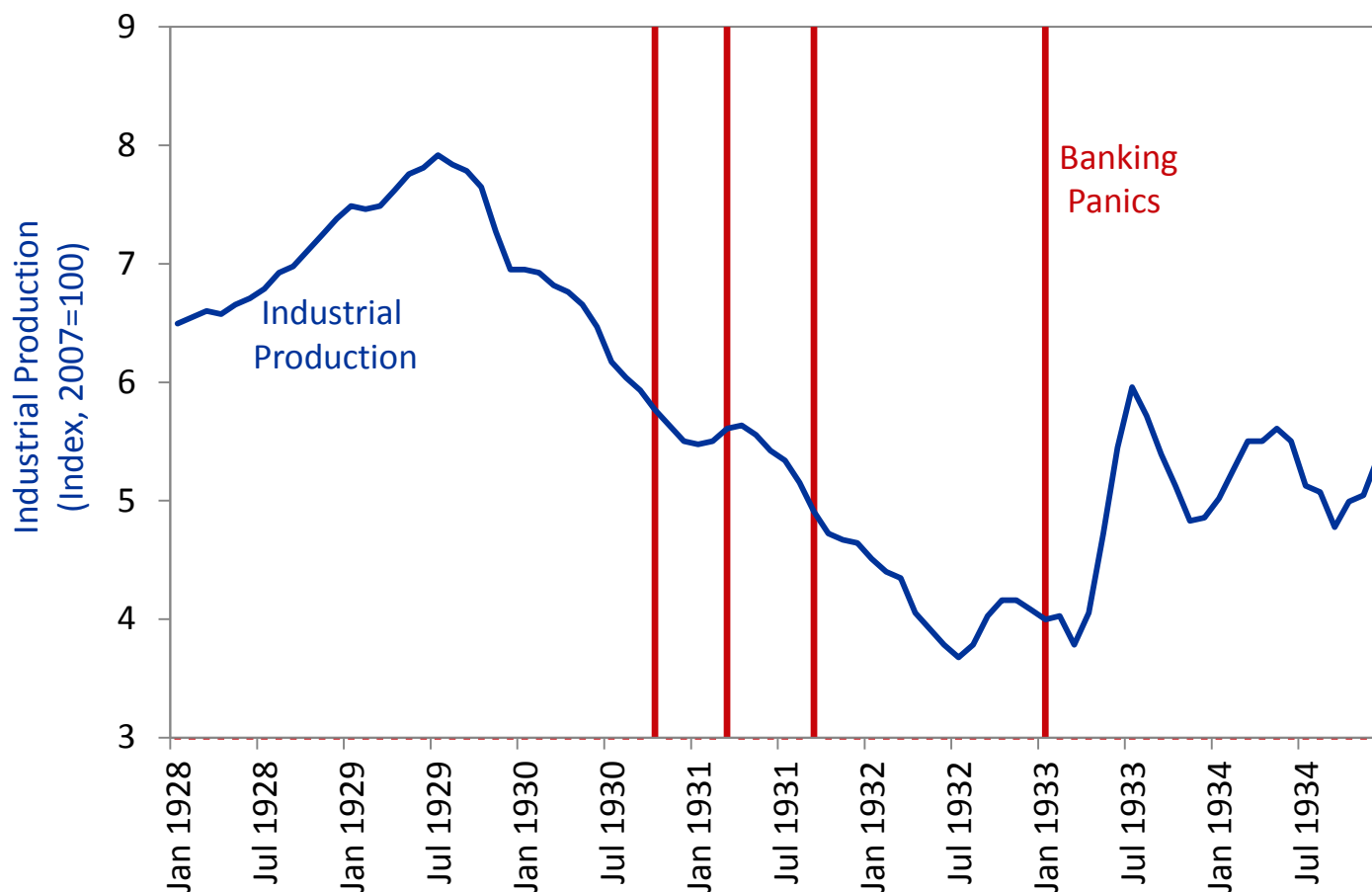
How does Richardson and Troost fit into the lecture?

- A bit awkward because it asks a different (but related) question.
- Methodology has much in common with narrative approach.
- Also adds new elements:
 - A natural experiment.
 - Cross-section data to answer a macro question.

Historical Background

- Friedman and Schwartz's 4th crucial episode: 1929–1931. An act of omission.
- Waves of panic in the Great Depression: Fall 1930, Spring 1931, Fall 1931, Fall 1932/Winter 1933.

Panics and Output in the Great Depression



Source: Friedman and Schwartz, *A Monetary History of the United States* and Federal Reserve, <http://www.federalreserve.gov>.

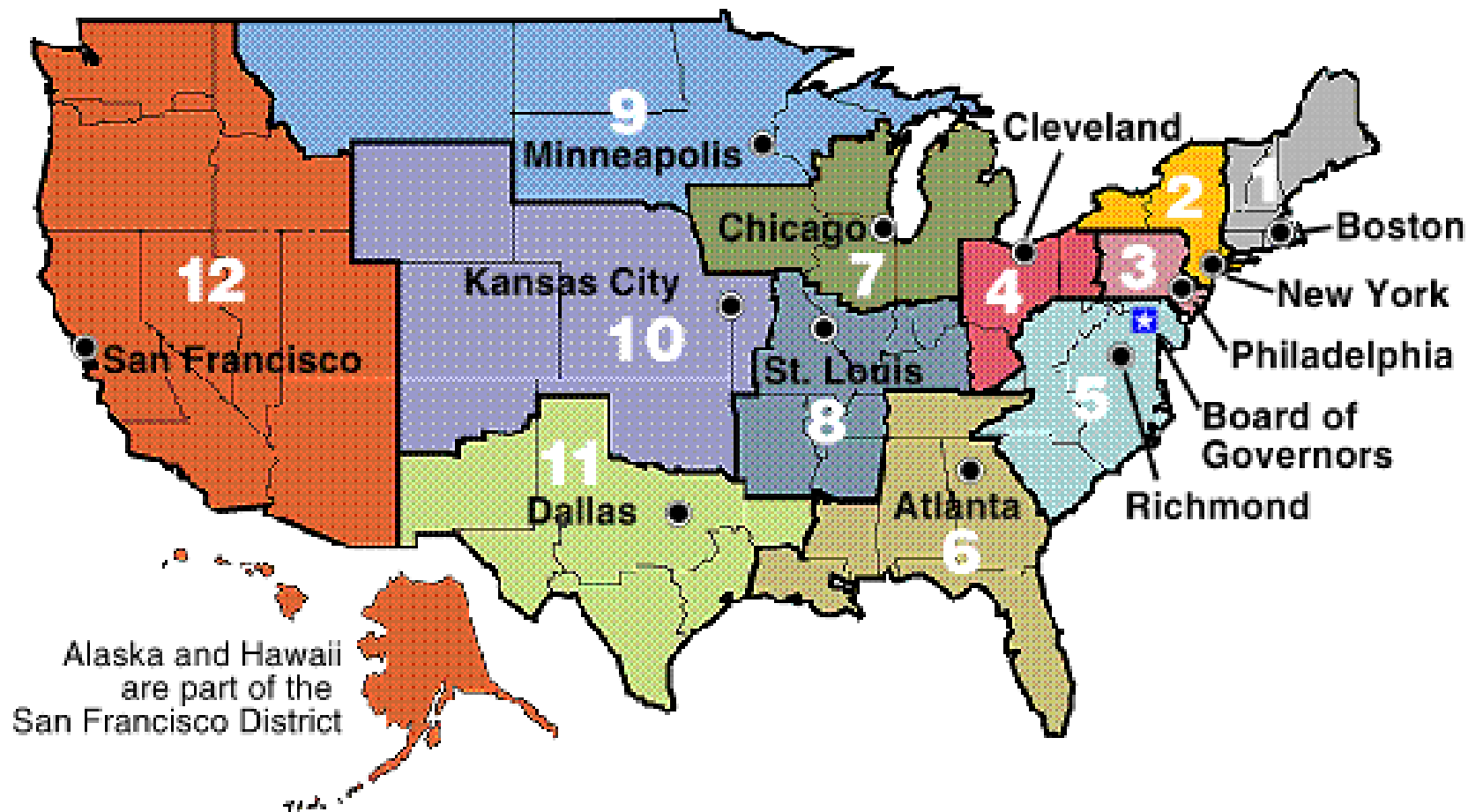
Two Views of Panics

- Panics due to loss of confidence and illiquidity, so monetary expansion could help. (Friedman and Schwartz)
- Panics due to insolvency, so monetary expansion cannot prevent failure. (Calomiris and Mason)

Richardson and Troost's Test

- Want to see if providing liquidity resulted in fewer failures.
 - If so, then the panic was confidence driven.
- Problems with a purely statistical approach.
- What is their approach?

Federal Reserve Districts



Richardson and Troost's Natural Experiment

- Mississippi (MS) was split between 2 Federal Reserve districts.
- Districts had very different approaches to panics *before* the Great Depression.
- In December 1930 there was a statewide banking panic.
- Can look for differences in bank failures in the two halves of MS.

What do they need to establish for this to be a good natural experiment?

- The two Fed districts (Atlanta and St. Louis) had different approaches to panics exogenously.
- Two halves of MS were otherwise the same.
- There was a statewide panic.

Evidence on Bank Policies

- Claim is that St. Louis (8th district) followed a real bills doctrine (lend in good times not bad) and Atlanta (6th district) followed Bagehot's Rule (aggressive discount lending during panics).
- How good is the narrative work?
- Judges ideas based in part on actions in the 1920s. Is this legitimate?
- Says that policy approaches became similar after 1931. Does this make you nervous?

Are the two halves of Mississippi otherwise similar?

- Why does this matter?
- What is the logic of looking at Mississippi in the first place?
- Is the evidence convincing that the two halves are similar?

Digression on Data Sources

- Rand McNally Bankers Directory
- U.S. Censuses of Agriculture and Manufacturing.
- Federal Reserve forms provide info on changes in bank status (suspensions versus liquidations).
- Census of American Business.
- Newspapers.

TABLE 1
NUMBER OF BANKS IN MISSISSIPPI ON JULY 1 OF EACH YEAR

YEAR	STATE CHARTER			NATIONAL CHARTER		
	All	Federal Reserve District		All	Federal Reserve District	
		6th Atlanta	8th St. Louis		6th Atlanta	8th St. Louis
1929	274	120	155	35	21	14
1930	259	105	154	35	22	13
1931	222	96	126	28	18	10
1932	206	89	108	27	18	9
1933	189	82	106	24	15	9

SOURCE.—*Rand McNally Bankers' Directory*, various July issues, 1929–35.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

TABLE 2
CHARACTERISTICS OF BANKS IN MISSISSIPPI ON JULY 1, 1929

	6TH FEDERAL RESERVE DISTRICT (Atlanta)						8TH FEDERAL RESERVE DISTRICT (St. Louis)					
	All 6th (N = 141)			Near Border (N = 76)			Near Border (N = 169)			All 8th N = 112)		
	Median	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	Mean	Standard Deviation	Median	Mean	Standard Deviation
Financial ratios:												
Net worth/total assets	.10	.11	.04	.10	.11	.04	.13	.14	.06	.11	.13	.05
Cash/total assets	.37	.38	.14	.36	.39	.14	.38	.37	.15	.38	.38	.15
Deposits/total liabilities	.87	.85	.07	.88	.85	.08	.85	.82	.11	.86	.83	.10
Financial characteristics:												
Total assets (\$1,000)	559	1,166	141	514	1,211	225	451	790	106	448	748	76
Loans and discounts (\$1,000)	334	676	1,070	278	713	1,288	270	464	755	256	437	668
Cash and exchanges (\$1,000)	92	204	310	84	228	373	92	174	276	91	157	237
Deposits (\$1,000)	506	1,003	1,445	465	1,040	1,699	379	662	993	369	629	869
Paid-up capital (\$1,000)	30	59	75	30	63	86	30	52	65	30	49	57
State-chartered banks (%)		.85	.36		.88	.33		.90	.30		.92	.28
Federal Reserve member (%)		.15	.36		.12	.33		.12	.32		.10	.30
Years in operation	24	23.2	12.3	24.5	24.0	12.7	21	21.9	14.9	20.5	21.8	14.2
Correspondents (N)	3	3.10	.90	3	3.08	.95	3	3.04	.89	3	2.96	.96

SOURCE.—*Rand McNally Bankers' Directory*, various July issues, 1929–35.

NOTE.—Near border sample consists of banks in counties for which at least 50 percent of the area lies within 1 degree latitude of the Federal Reserve district border.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

TABLE 3
CHARACTERISTICS OF COUNTIES IN MISSISSIPPI IN 1930

	6TH FEDERAL RESERVE DISTRICT (Atlanta)				8TH FEDERAL RESERVE DISTRICT (St. Louis)			
	All		Near Border		Near Border		All	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Population (1,000s)	22.4	14.4	28.2	17.7	30.4	17.2	26.8	14.2
Persons per square mile	37.4	19.7	41.5	20.3	51.4	21.5	49.3	18.6
Urban population share (%)	14.2	22.3	12.2	22.8	12.5	11.1	9.3	10.8
Black population share (%)	43.4	18.2	49.5	18.2	56.1	18.1	49.6	23.3
Number of manufacturing establishments	20.1	20.0	25.6	24.6	27.1	14.1	25.2	15.9
Average annual manufacturing wage (\$)	754.8	150.6	779.2	129.3	753.7	182.9	711.2	178.7
Net sales, retail stores, annual per capita (\$)	190.0	76.8	188.2	91.7	185.0	51.5	175.1	54.0
Fraction of population in labor force (%)	38.8	6.2	41.3	6.3	42.9	7.6	42.4	8.0
Unemployment rate (%)	1.8	2.0	1.0	1.1	.6	.4	.5	.4
Fraction of farm acres in cotton (%)	57.5	26.4	68.0	18.2	77.7	14.1	79.7	11.9
Fraction of farm acres with crop failures (%)	3.3	6.4	3.8	7.3	1.1	.5	1.1	.8
Farm mortgage debt as a percentage of farm value	33.2	5.3	35.3	4.2	41.2	7.2	41.6	6.1
Interest charges as a percentage of mortgage debt	7.0	.5	6.9	.4	6.9	.5	6.9	.4

SOURCE.—Historical, Demographic, Economic, and Social Data: The United States, 1790–1970 (<http://www.icpsr.umich.edu/icpsrweb/ICPSR/>). For comparisons of additional characteristics, see Richardson and Troost (2006).

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

Was there a statewide panic?

- Possible causes
- Have news reports of widespread runs.
- Affects both halves of the state.
- Deposits fall by about 30%.

Basic Findings

- The two Federal Reserve banks responded very differently to the collapse of Caldwell and Co.
- Very different levels of suspensions and failures in the two halves of Mississippi.

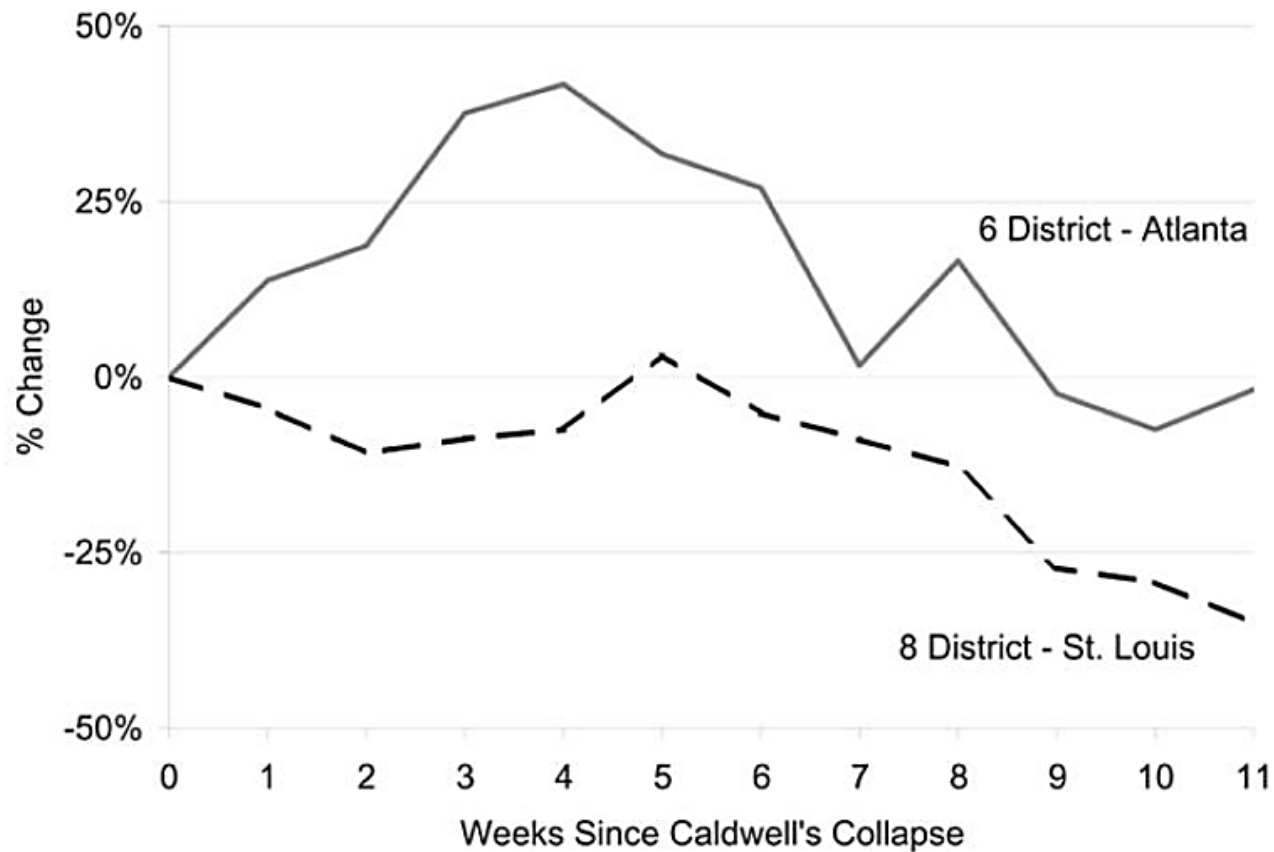


FIG. 2.—Discount response after the collapse of Caldwell, aggregate discounts each week as a percentage of initial level. Source: See Section II.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

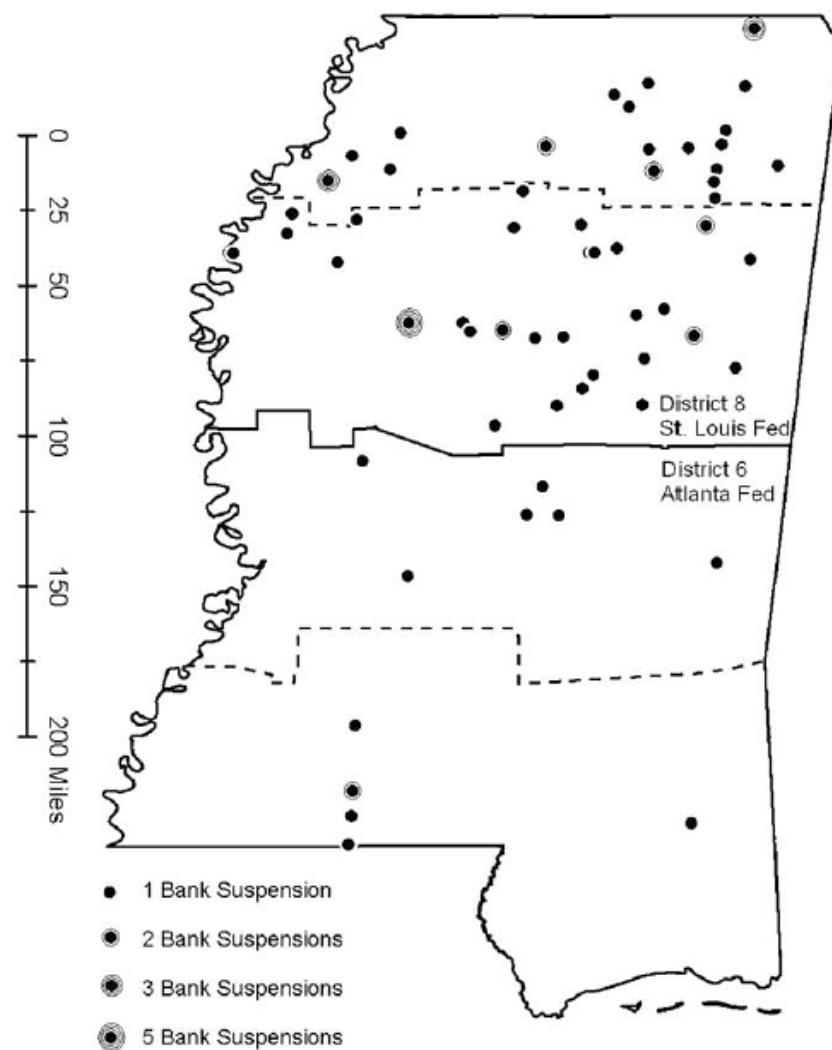


FIG. 1.—Mississippi's division into Federal Reserve districts and bank suspensions between October 1930 and March 1931. Source: See Section II. The solid line represents the Federal Reserve district border. The dotted lines enclose the counties for which at least half the area lies within 1 degree latitude of the district border.

TABLE 4
BANK SUSPENSIONS AND LIQUIDATIONS

			PERCENTAGE OF BANKS SUSPENDING			PERCENTAGE OF BANKS LIQUIDATING		
			Federal Reserve District			Federal Reserve District		
Begin July 1		End June 30	All (1)	6th Atlanta (2)	8th St. Louis (3)	All (4)	6th Atlanta (5)	8th St. Louis (6)
1929	to	1930	4.8	7.1	3.0	4.5	7.1	2.4
1930	to	1931	28.9	14.2	39.5	13.6	7.1	18.6
1931	to	1932	13.2	14.9	11.8	8.0	7.9	8.1
1932	to	1933	7.7	7.5	7.9	7.3	6.5	7.9
1933	to	1934	.9	.0	1.7	.9	.0	1.7
1929	to	1934 ^a	49.8	38.7	59.2	30.9	26.8	34.4

SOURCE.—*Rand McNally Bankers Directory* and National Archives and Records Administration Record Group 82. See Section II and Richardson (2006, 2007*a*, 2007*b*, 2008) for details.

^a The last row indicates the percentage of banks operating on July 1, 1929, that either suspended or liquidated by June 30, 1933.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

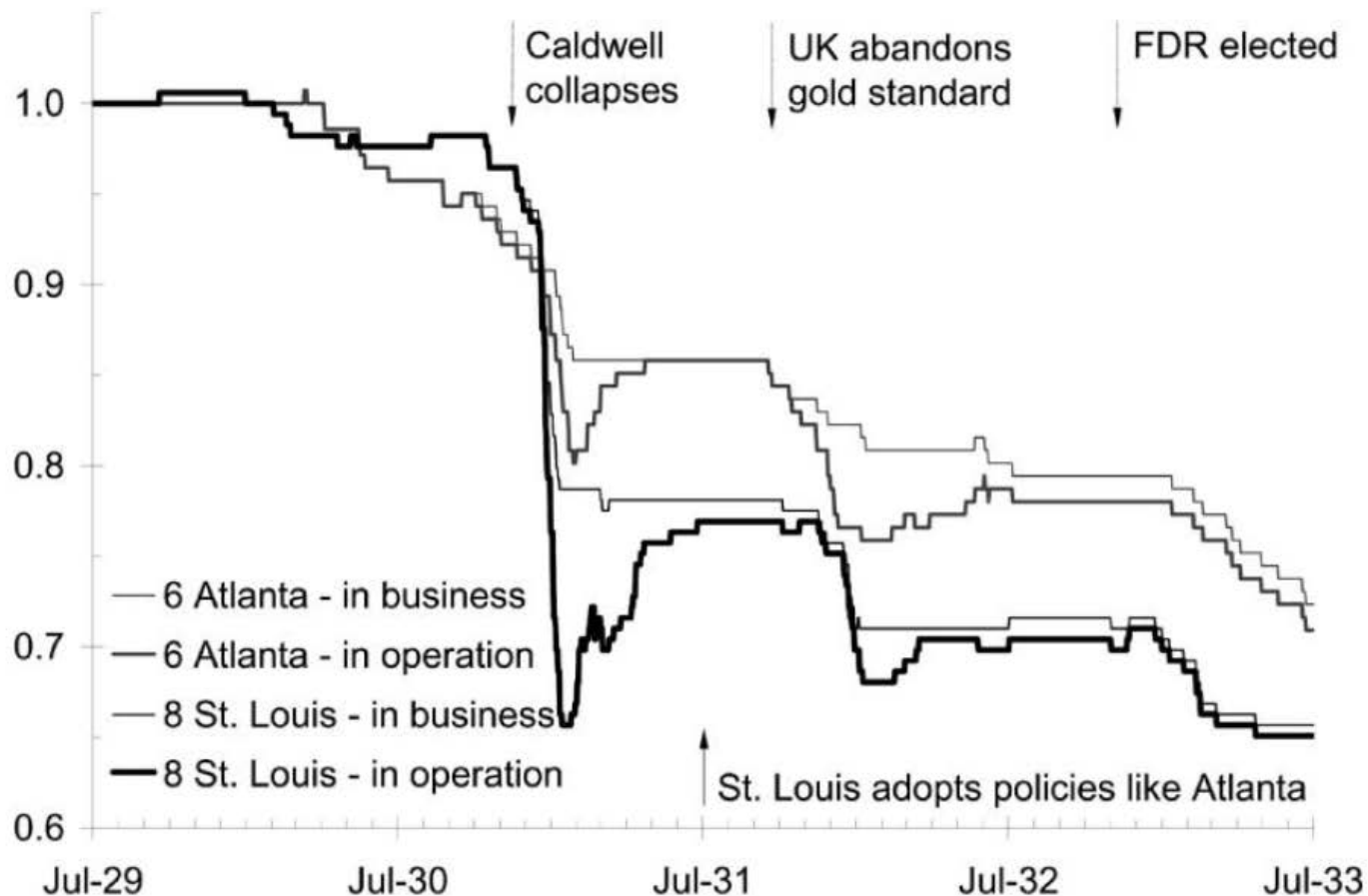


FIG. 3.—Percentage of banks in business and in operations in the 6th and 8th Federal Reserve Districts in Mississippi, July 1929 to June 1933. Source: See Section II.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

Nonparametric Estimates

⁵ Our estimates of the survival function, $S(t)$, the raw hazard function, $h(t)$, and the smoothed hazard function, $g(t)$, are

$$\hat{S}(t) = \prod_{t_i < t} \frac{n_i - d_i}{n_i},$$

where n_i is the number of banks in business at the beginning of time period t_i , d_i is the number of banks experiencing an event (such as entering receivership) at time t_i , and t_i indicates the i th time period. The raw hazard for period t_i is

$$\hat{h}(t_i) = \frac{d_i}{n_i}.$$

The hazard function is estimated by smoothing raw hazards, so that the hazard in the i th time period is

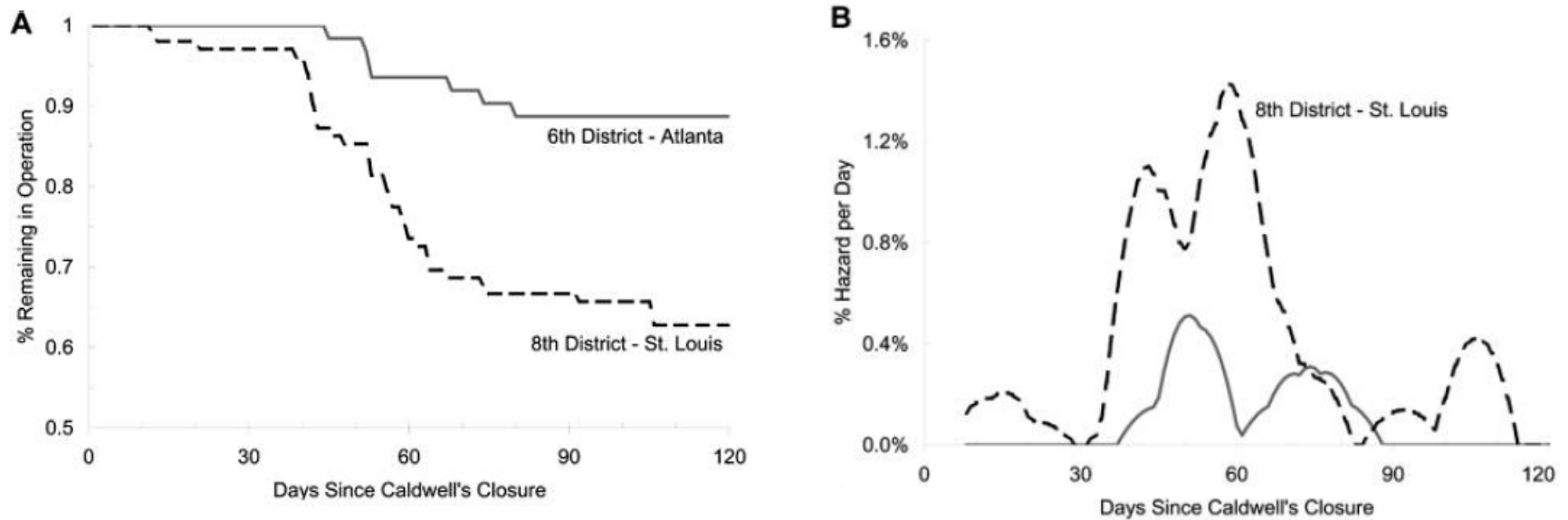
$$\hat{g}(t_i) = \sum_{z=-u}^u K_z \hat{h}(t_{i+z}),$$

where u is the bandwidth and

$$K_z = \frac{(u+1)^2 - z^2}{\sum_{z=-u}^u [(u+1)^2 - z^2]}.$$

FIG. 4.—Survival and hazard during the post-Caldwell panic, principle nonparametric controls.

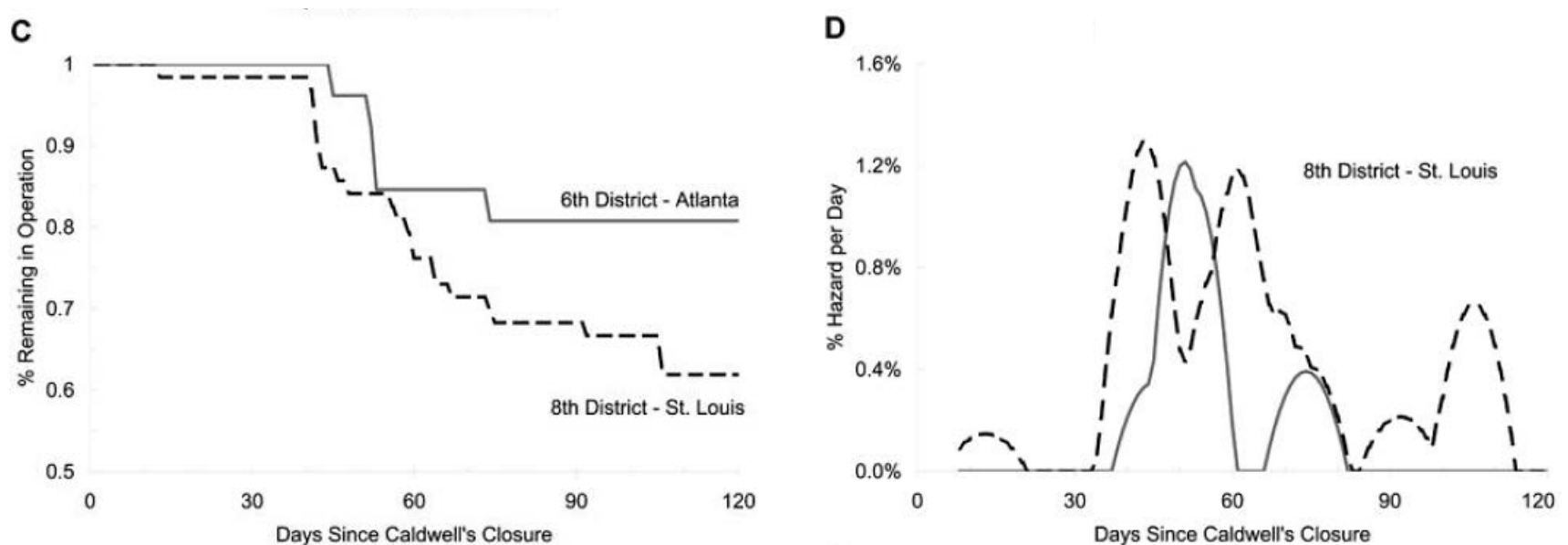
All Banks



From: Richardson and Troost, "Monetary Intervention Mitigated Banking Panics"

FIG. 4.—Survival and hazard during the post-Caldwell panic, principle nonparametric controls.

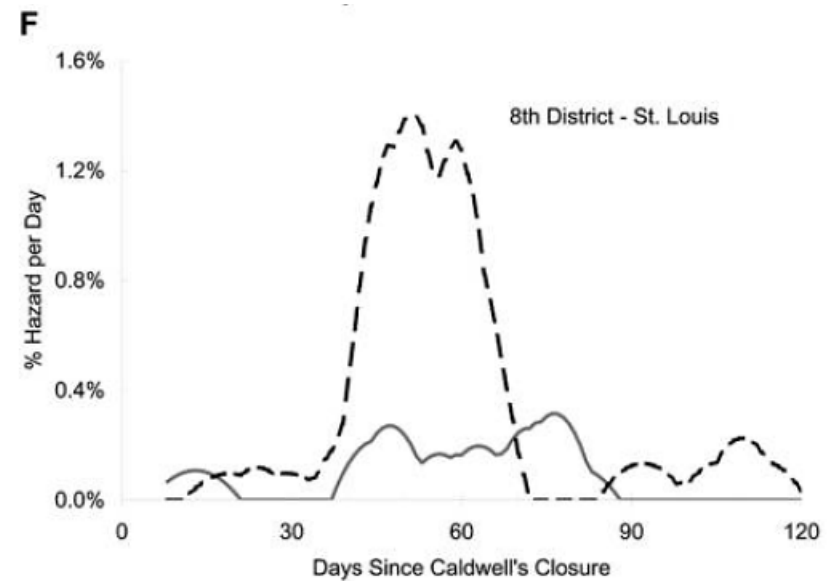
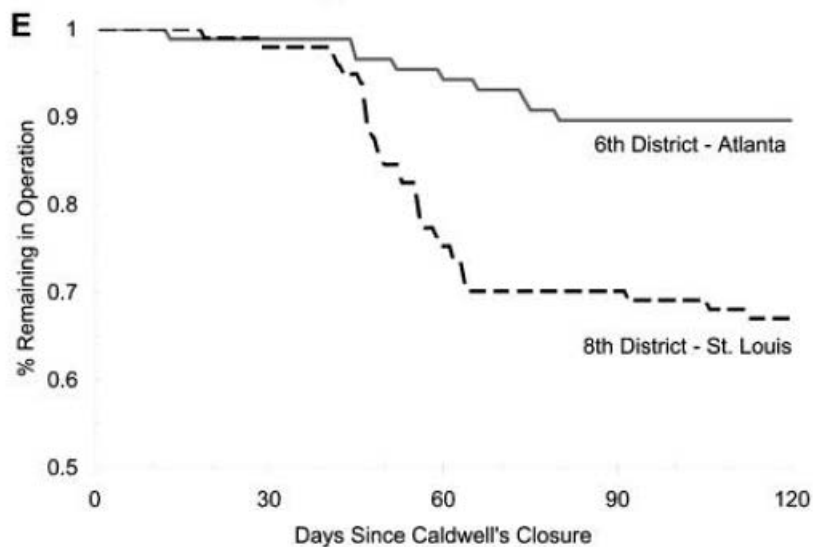
Within 1° Latitude of District Border



From: Richardson and Troost, "Monetary Intervention Mitigated Banking Panics"

FIG. 4.—Survival and hazard during the post-Caldwell panic, principle nonparametric controls.

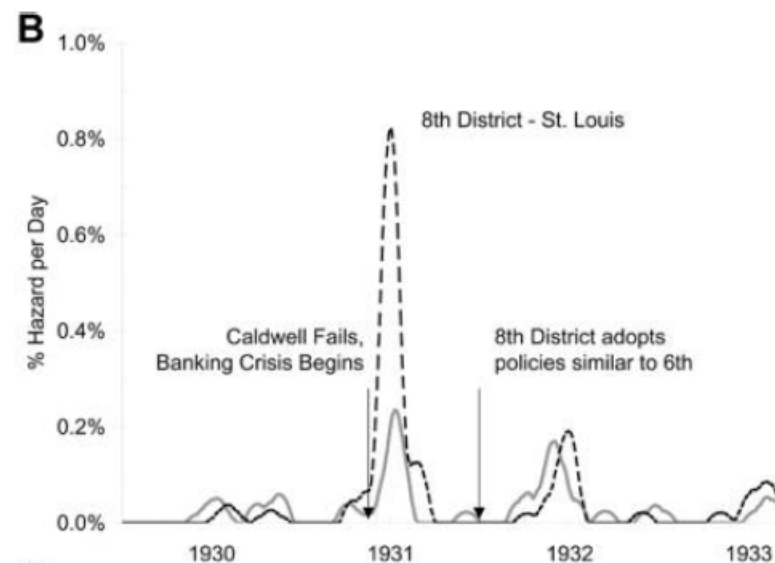
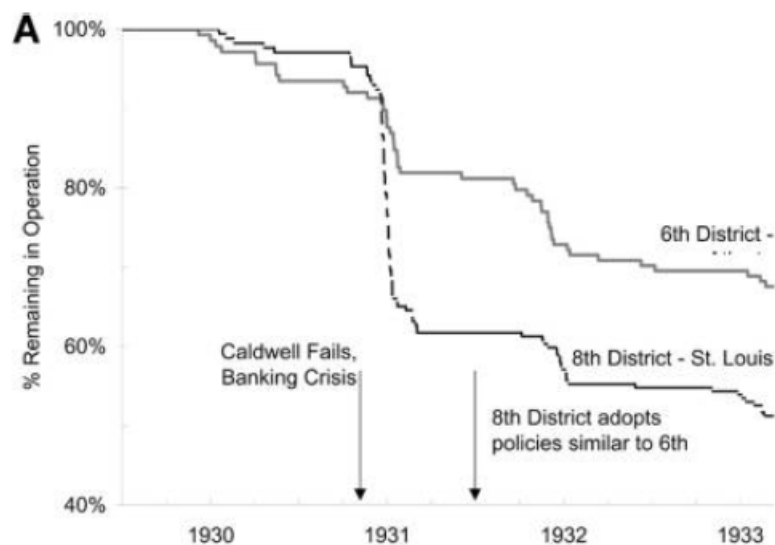
Banks Founded before the Fed



From: Richardson and Troost, "Monetary Intervention Mitigated Banking Panics"

FIG. 5.—Bank suspension in the 6th and 8th Federal Reserve Districts, July 1929 through February 1933.

All Banks



From: Richardson and Troost, "Monetary Intervention Mitigated Banking Panics"

Parametric Estimates

- Log-logistic survival model
- Unit of observation is an individual bank; dependent variable is log days until distress (starting 7/1/29).
- Many controls for bank and county characteristics.
- Dummy for panic period (such as fall 1930).
- Key variable is an interaction term between panic period and in the Atlanta Federal Reserve District.

TABLE 5
LOG-LOGISTIC SURVIVAL REGRESSIONS FOR INDIVIDUAL BANKS
Dependent Variable: Log Days until Bank Distress

	(1)
Fed Atlanta during crisis 1930	11.20* (1.18)
Fed Atlanta during crisis 1931	1.25 (.84)
Fed Atlanta during crisis 1933	.61 (.92)
Federal Reserve Atlanta	−1.01* (.38)
Banking crisis—fall 1930	−12.38* (1.19)
Banking crisis—fall 1931	−2.85* (.74)
Banking crisis—winter 1933	−1.00 (.70)
Assets % cash	

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

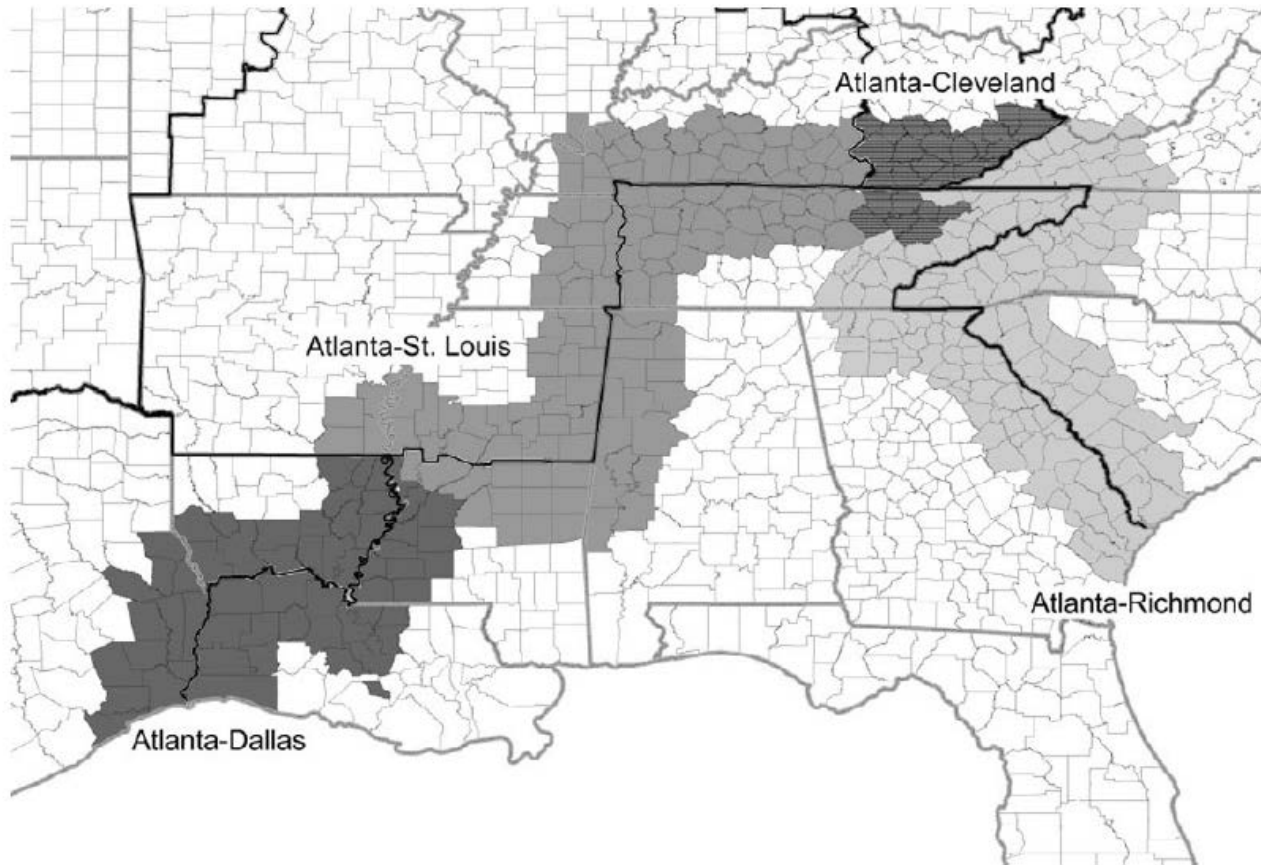
Robustness Discussion

- Incredibly thorough!
- Example: Were banks in the northern half of MS more connected with Caldwell and Co.? (No)
- Example: Were there other shocks or policies in either half of the state? (Again, no)

Evaluation

- Did you like it?
- What could have been done better?

FIGURE 1
COUNTIES WITHIN FIFTY MILES OF ATLANTA FED DISTRICT BORDER



From: Andrew Jalil, "Monetary Intervention Really Did Mitigate Banking Panics during the Great Depression"

FIGURE 3
BANK SUSPENSION RATES, 1930

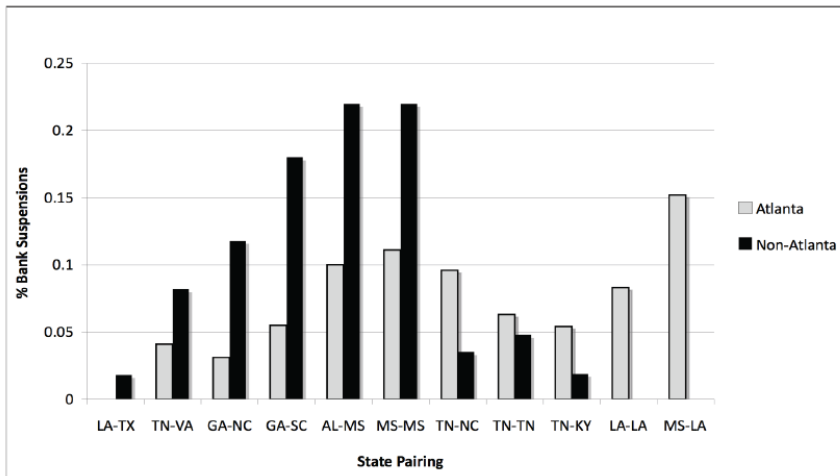
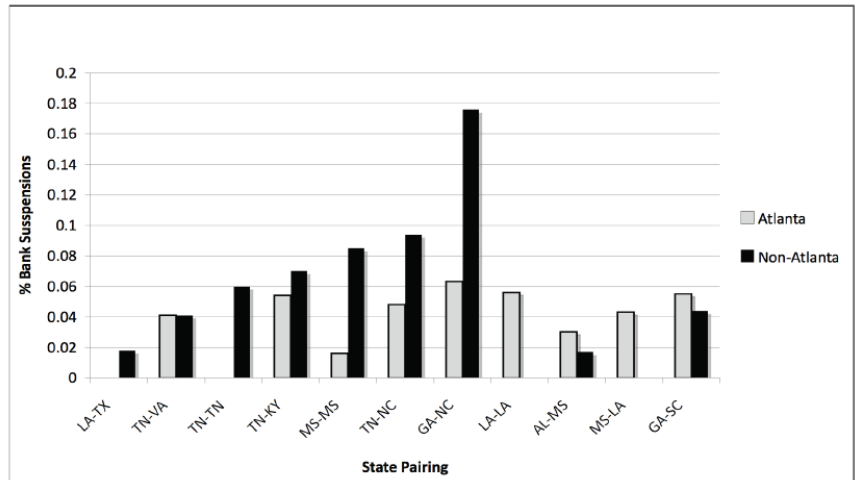


FIGURE 4
BANK SUSPENSION RATES, 1931



From: Andrew Jalil, “Monetary Intervention Really Did Mitigate Banking Panics during the Great Depression”

Did the difference in Fed policy matter for real outcomes in the two halves of Mississippi?

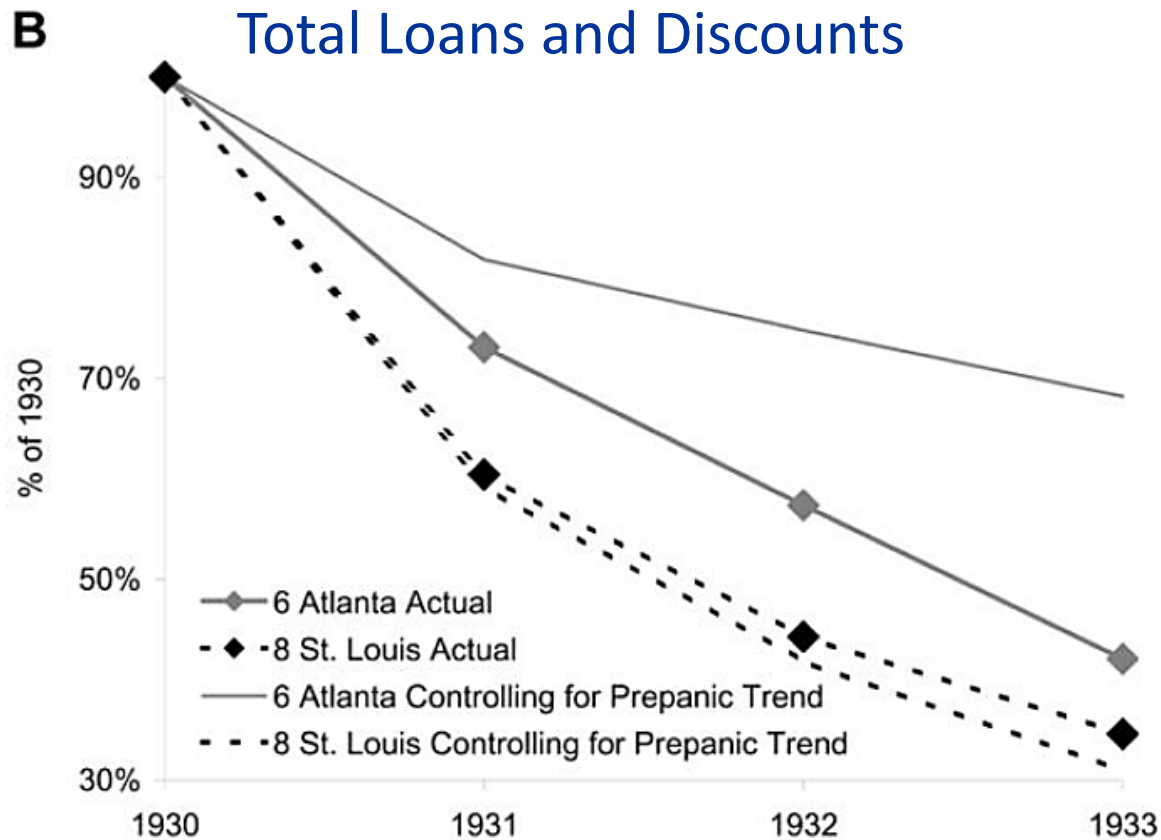


FIG. 6.—Comparing consequences of the banking panics in the 6th and 8th Districts. *A*, Total deposits as a percentage of total deposits in June 1930. *B*, Total loans and discounts as a percentage of the total in June 1930.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

TABLE 8
DECLINE IN WHOLESALE TRADE

	FEDERAL RESERVE DISTRICT	
	6th Atlanta	8th St. Louis
Wholesale firms:		
Number in 1929	783	930
Number in 1933	641	607
$\Delta\%$	-18.1	-34.7
Net sales:		
\$1,000s in 1929	140,776	245,486
\$1,000s in 1933	59,513	83,727
$\Delta\%$	-57.7	-65.9

SOURCE.— *Census of American Business*, 1929 and 1933.

From: Richardson and Troost, “Monetary Intervention Mitigated Banking Panics”

TABLE 2—EFFECTS ON OUTPUT VARIABLES

	Revenue				Physical output		
	Within (1)	Balanced (2)	Unbalanced (3)	County (4)	Within (5)	Balanced (6)	Unbalanced (7)
St. Louis Fed 1931	−0.24*** (0.06)	−0.21*** (0.08)	−0.18** (0.09)	−0.28* (0.16)	−0.37*** (0.11)	−0.53** (0.19)	−0.43** (0.17)
St. Louis Fed	—	−0.12 (0.11)	−0.15* (0.08)	—	—	−0.18 (0.20)	0.20 (0.28)
Observations	1,226	635	1,224	148	479	282	479
Adjusted R^2	0.57	0.61	0.56	0.94	0.64	0.81	0.79

Notes: All dependent variables are in logs. The within specification includes plant fixed effects. All the regressions include industry-specific time trends though the coefficients are excluded for clarity. The price and quantity effects are only for plants producing one good. Plant-clustered standard errors are reported in parentheses. County-level regressions include full set of county fixed effects with standard errors clustered at the county level and observations weighted by number of plants in a given county. Note there is no St. Louis Fed coefficient for the county estimates because I estimate a full set of county fixed effects.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

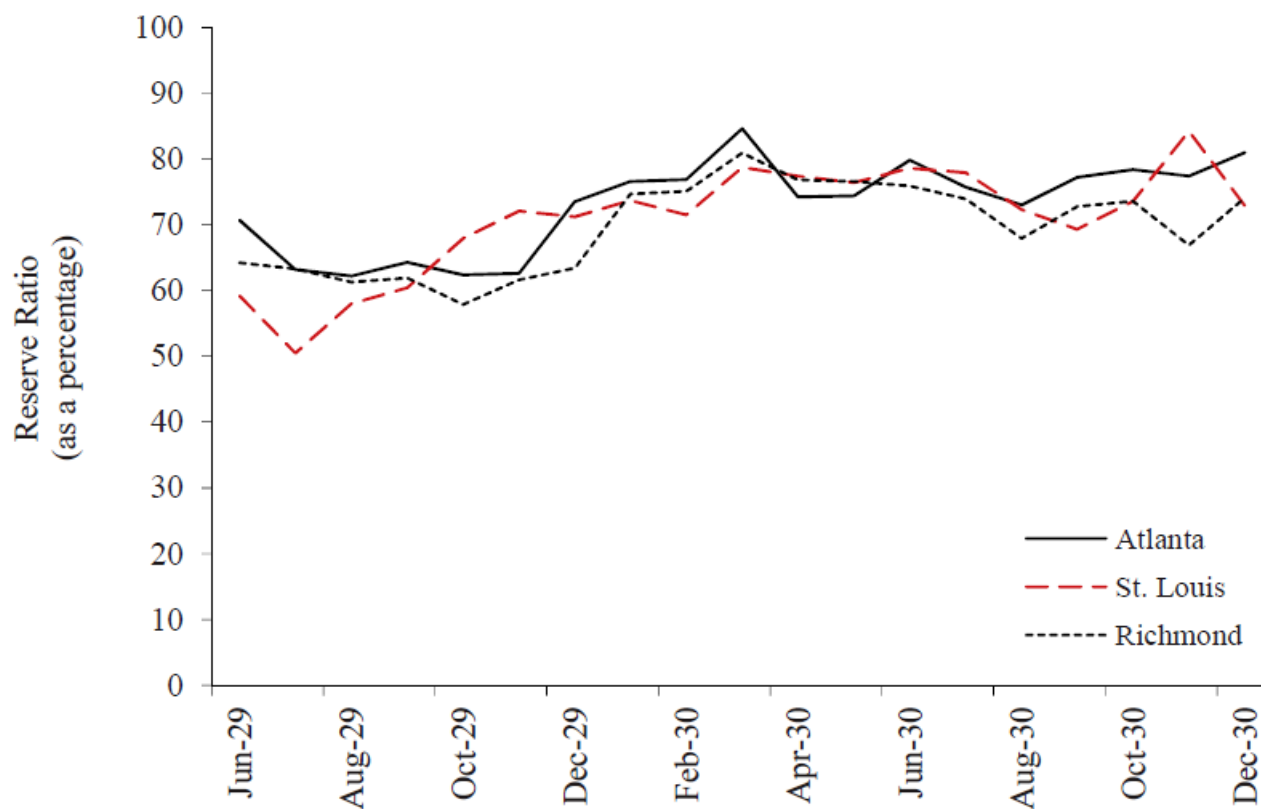
* Significant at the 10 percent level.

From: Nicholas Ziebarth, “Identifying the Effects of Bank Failures from a Natural Experiment in Mississippi during the Great Depression”

Do the Results Generalize?

- Even if monetary intervention could have mitigated panics, could every Federal Reserve Bank have behaved like the Atlanta Fed?

FIGURE 2
RESERVE POSITION OF ATLANTA, ST. LOUIS, AND RICHMOND FEDERAL RESERVE
BANKS



From: Andrew Jalil, "Monetary Intervention Really Did Mitigate Banking Panics during the Great Depression"