LECTURE 2
The Effects of Monetary Changes:
Narrative Evidence and Natural Experiments

September 7, 2011

I. Andersen and Jordan, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization"

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

Potential Problems with the St. Louis Equation

1. Endogenous policy causing correlation between e and the m's.

2. Developments in the private economy causing correlation between e and the m's.

2 General Comments about Omitted-Variable Bias

1. Think in terms of omitted-variable bias or correlation of right-hand side variables with the residual, <u>not</u> in terms of simultaneity or endogeneity.

2. It's always good to think about what <u>direction</u> we expect bias in OLS to go.

II. Friedman and Schwartz, "A Summing Up"

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."

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."

CHART 62
Money Stock, Income, Prices, and Velocity, in Reference Cycle Expansions and Contractions, 1867 – 1960
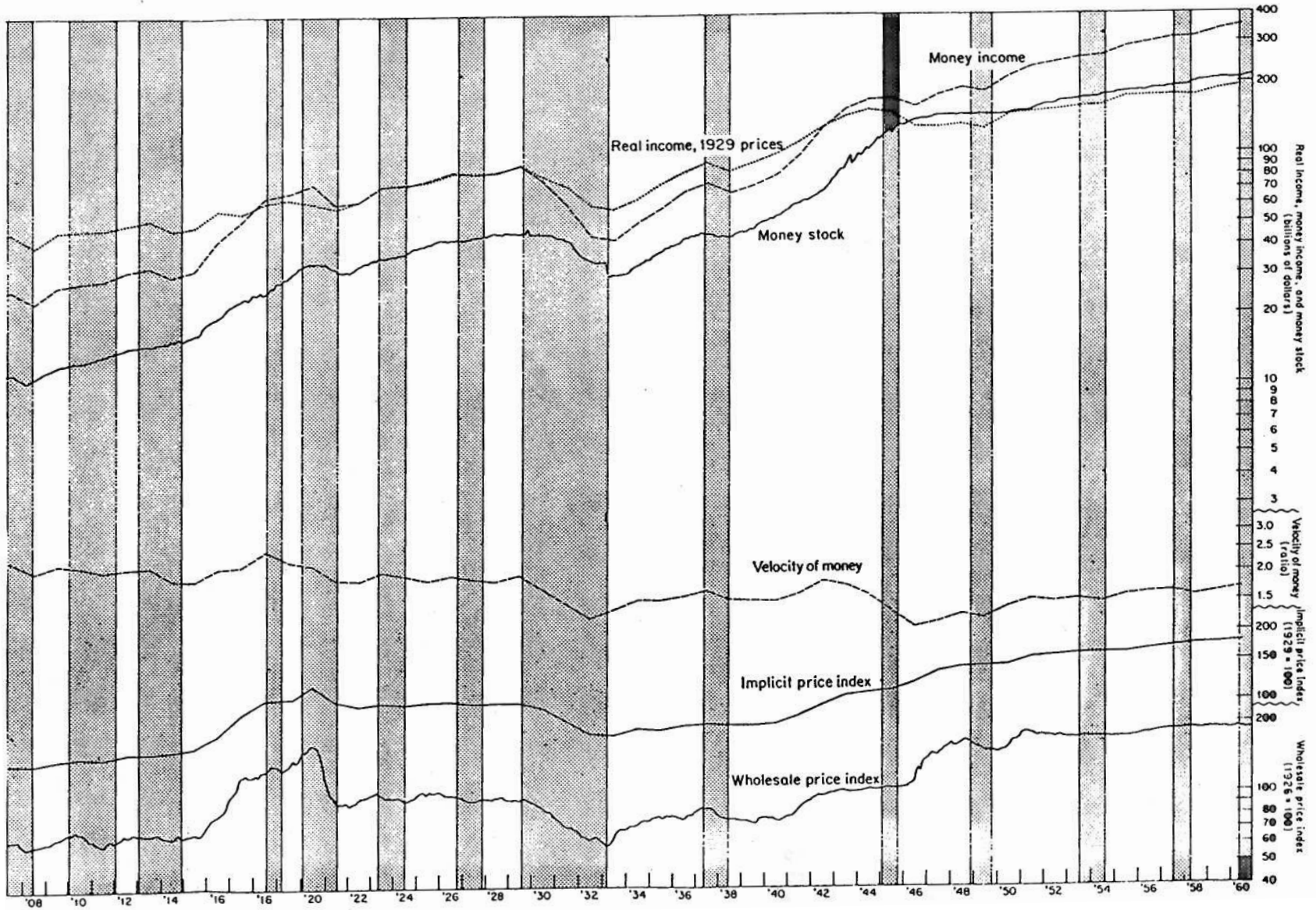
Friedman and Schwartz's Strengths

1. Understood the identification problem.

2. Proposed a brilliant solution.

3. Outstanding use of narrative sources.

Friedman and Schwartz's Weaknesses

Friedman and Schwartz's Weaknesses

1. Definition of a monetary shock is vague.

2. Selectivity.

3. The movements in m aren't completely independent.

4. No statistical tests.

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.

Dates:

October 1947
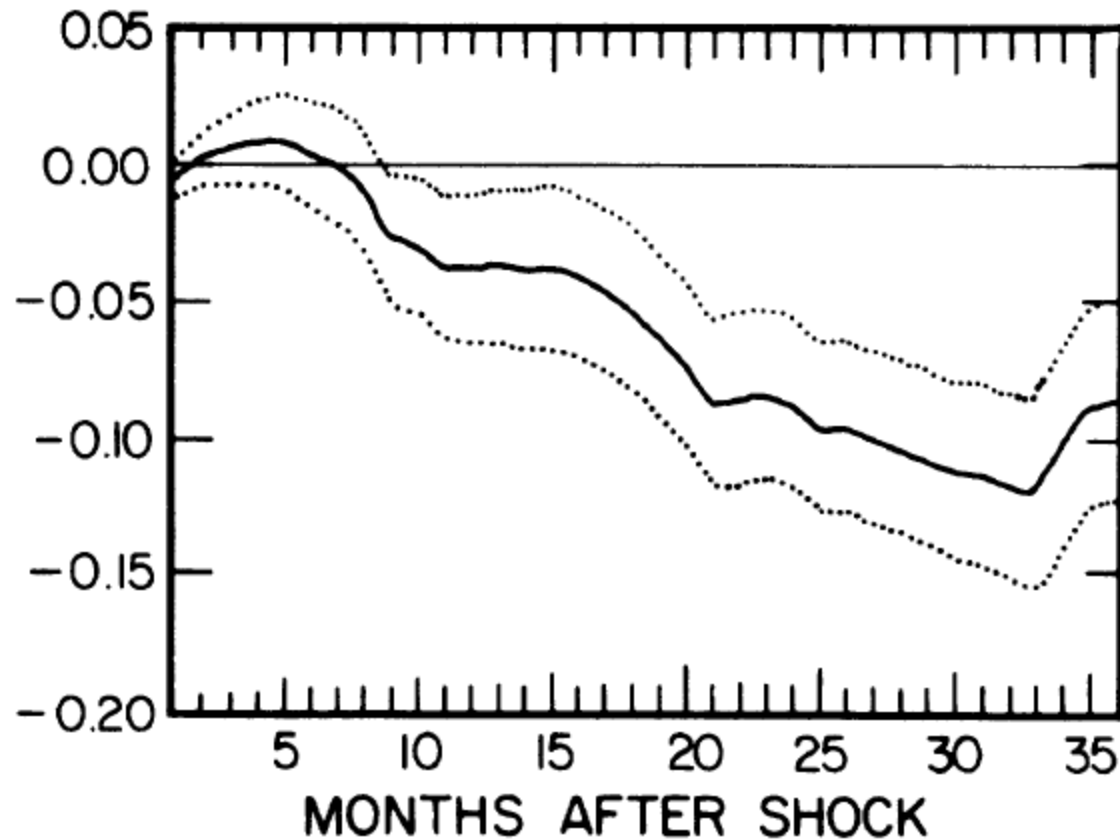
September 1955

December 1968

April 1974

August 1978

October 1979

(December 1988)

Romer and Romer (1989)

Figure 4 IMPULSE RESPONSE FUNCTION FOR BASIC INDUSTRIAL PRODUCTION REGRESSION

III. Velde: "Chronicle of a Deflation Unforetold"

Monetary Framework in 18th Century France

Mint Price (MP):

Price government pays for silver sold to the mint. (Suppose it is 3 livre/oz.)

Mint Equivalent (ME):

Declared value of a coin.

(Suppose it is 4 livre for a coin with 1 oz of silver in it).

Seigniorage: Difference between ME and MP.

Monetary Changes in 1724

TABLE 1
CHANGES IN THE LEGAL TENDER VALUE OF THE SILVER ECU, 1723–24

Date	Ecu's Value	Diminution (%)	Cumulative Diminution (%)
December 1720	7.5		
August 1723	6.9	−8.0	−8.0
February 1724 (1)	6.3	−8.7	−16.0
April 1724 (2)	5	−20.6	−33.3
September 1724 (3)	4	−20.0	−46.7
Recoinage			−44.7

From: Velde, "Chronicle of a Deflation Unforetold"

FIG. 1.—ME (upper thick line) and MP (lower thin line), France, 1685–1730 (log scale).
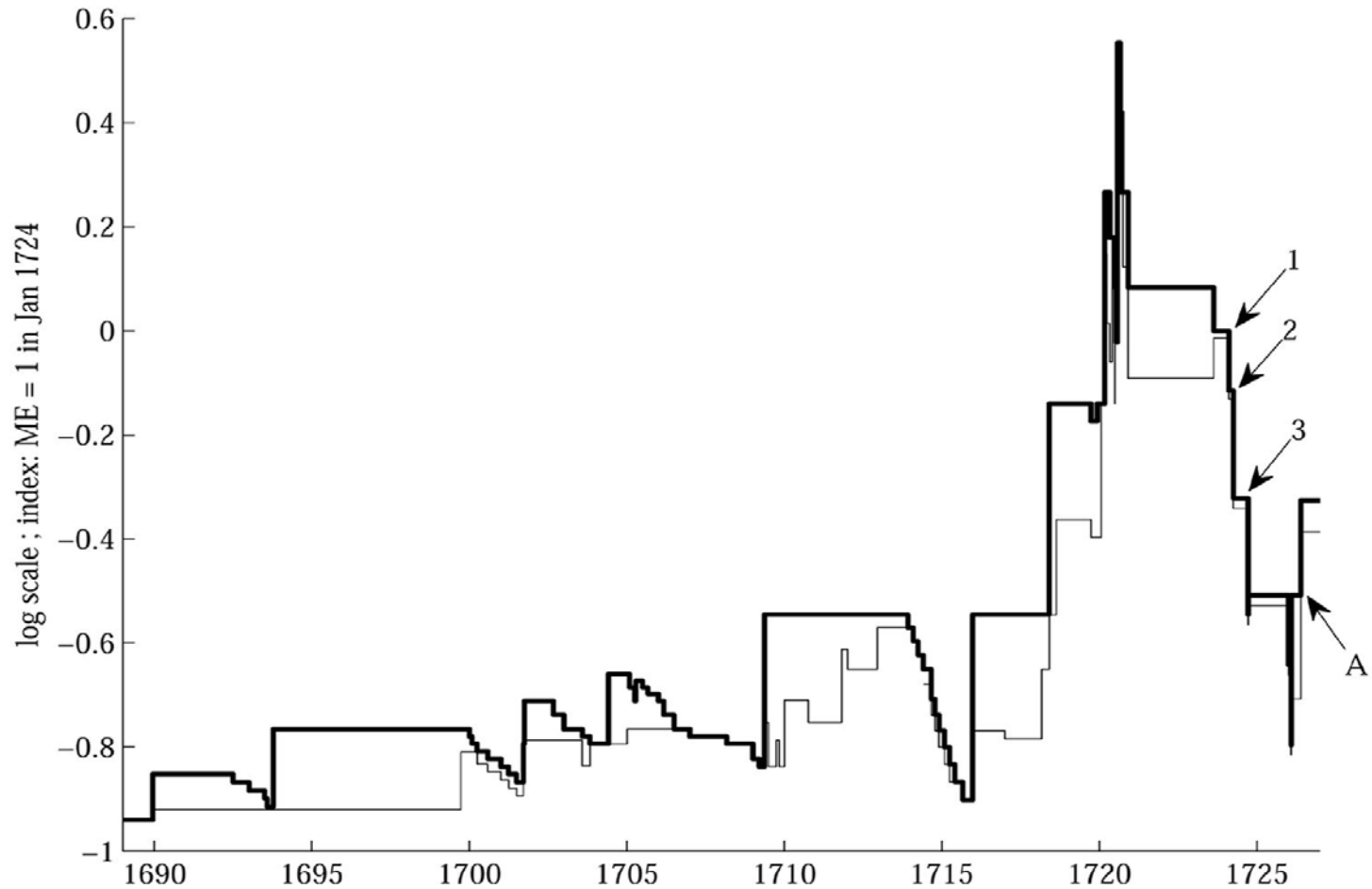
From: Velde, "Chronicle of a Deflation Unforetold"

The Model

Let $\{Y_{it}\}_{i=1}^N$ be the original series, where i denotes the region or the commodities and $y_{it} = \log(Y_{it})$. The general model is

$$y_{it} = \gamma_i + \lambda_i \mu_t + \epsilon_{it},$$

$$\mu_t = \mu_{t-1} + \xi_t,$$

with $\epsilon_{it} \sim (0, \sigma_{\epsilon_i}^2)$ and $\xi_t \sim (0, \sigma_\xi^2)$. The parameters λ_i, γ_i, $\sigma_{\epsilon_i}^2$, and σ_ξ^2 are estimated by maximum likelihood, using an exact initial Kalman filter (Koopman 1997; Durbin and Koopman 2001), with γ_1 and λ_1 normalized to the sample mean and standard deviation of y_1. The trend is modeled as a random walk; more general formulations, such as adding a time trend, a seasonal factor, or making the trend locally linear, as in Harvey (1989, 45), did not improve the fit: thus the data are not seasonally adjusted. The index is then scaled as

From: Velde, "Chronicle of a Deflation Unforetold"

FIG. 3.—Exchange rates on Paris in London, in French units of account per British unit of account, 1721–29. The line plots an index of the silver parity between the units of account. Source: *Course of the Exchange.*
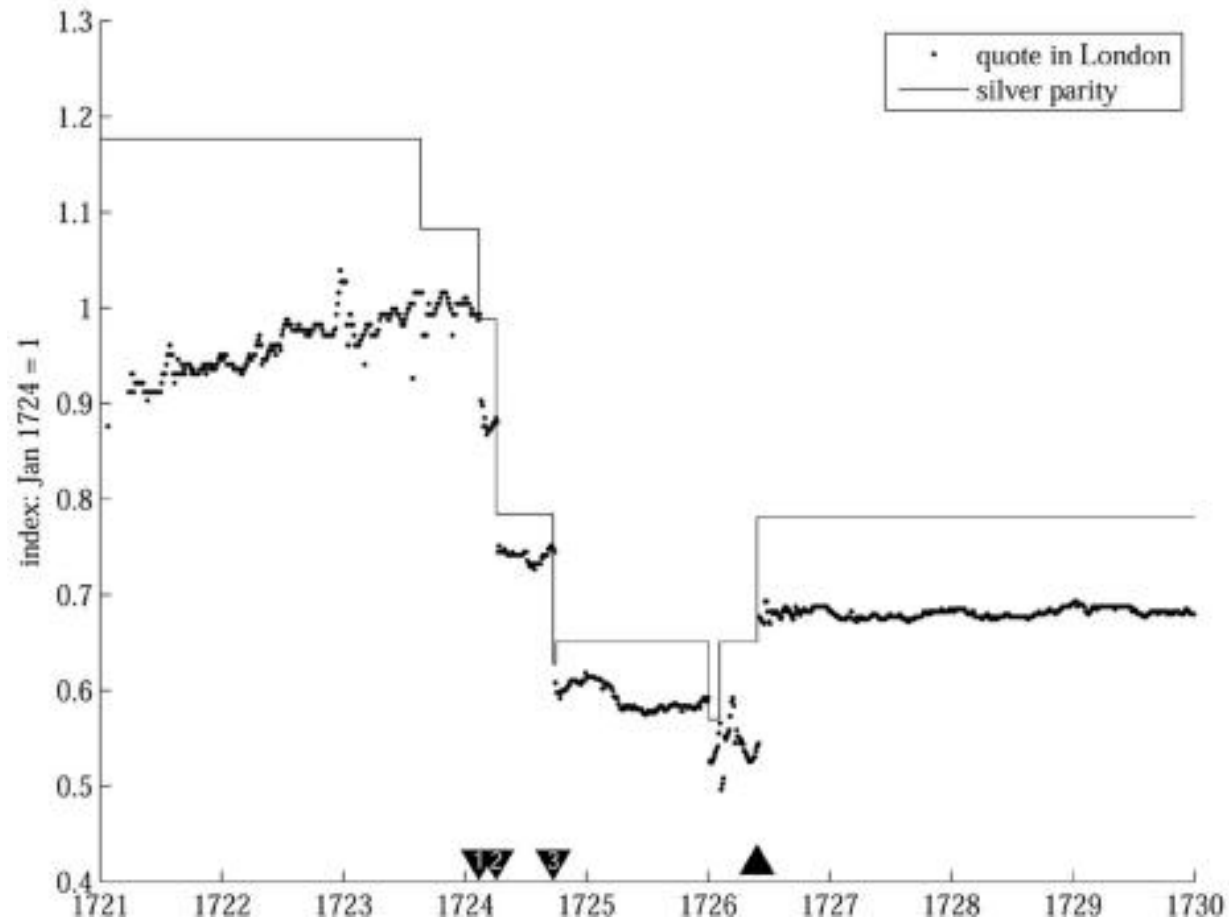
From: Velde, "Chronicle of a Deflation Unforetold"

Fig. 5.—Annual exports and imports, 1716–40. Sources: Romano (1957), AN F/12/534A.
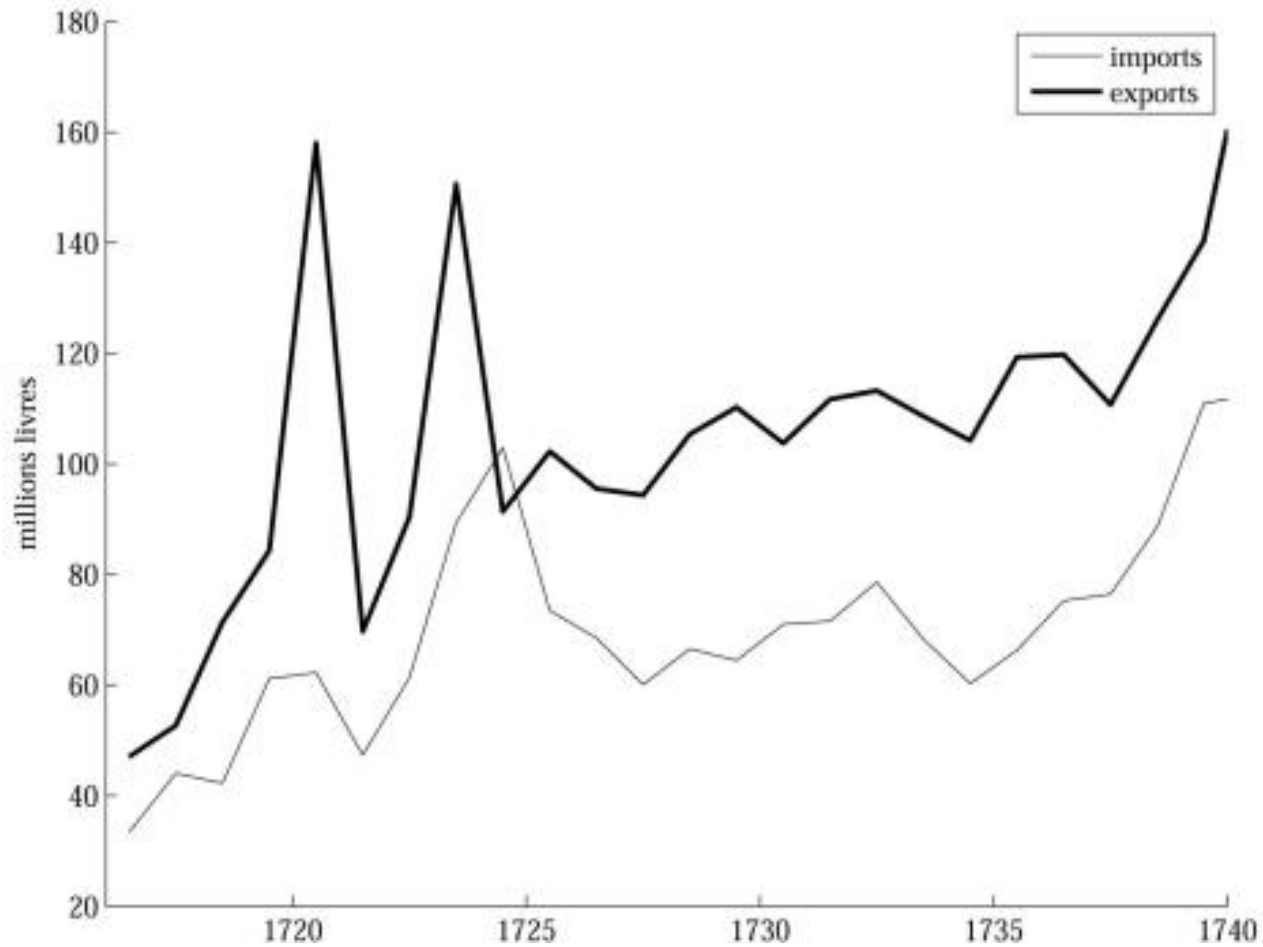
From: Velde, "Chronicle of a Deflation Unforetold"

TABLE 2
Prices of Various Commodities at the Halles Market, 1724

	WHEAT			BREAD		EGGS (Average)	PORK (Average)	CANDLES (Average)	BUTTER (Average)
	High	Low	Mode	High	Low				
February 1724:									
1	25.5			3.75		52.5	6.75	14.5	95
5	25.5			3.75		52	7.75	14.5	75
9	25			3.5		57.5	7.75	14.5	80
12*	24.25			3.5		65	7.75	14.5	85
16	24.5			3.5		70	6.75	14.5	85
April 1724:									
1	27.5			3.25				14.5	85
5*	23.5			3.25				14.5	85
8	25			3.25				14.5	92
12	24.5			3.25				14.5	90
September 1724:									
6	25			3		29	6.75	10.5	60
9	25.25			3		29.5	6.75	10.5	63
13	26.5			3.25		30	6.75	10.5	60
16	27.25			3.25		34	6.75	10.5	72
20	26.75			3.25		34	6.75	10.5	66
23*	25			3.25		35	6.75	10.5	65
27	25.75			3.25		32	6.75	10.5	63
30	26			3.25		36.5	6.75	10.5	65
May–June 1726:									
15	24.5	12	20	2.75	2.5	24	5.75	9.75	46
18	24	12.5	18.25	2.75	2.5	23	5.75	9.75	46
22	24	12	19	2.75	2.5	25	5.75	9.75	46
25	23.25	12	18.5	2.75	2.5	23.5	5.75	9.75	46
29*	23.25	12	20.5	2.75	2.5	23.5	5.75	9	43
1	23.25	12.5	19.9	2.75	2.5	23.5	6	9	42
5	23.25	13	21	2.75	2.5	25	6.25	9	
8	23.25	13	22	2.75	2.5	24.5	7.25	9	42
12	23	13	21	2.75	2.5	23.5	6.75	9	40

SOURCES.—Dutot ([1738] 1935, 76), Institut mss. 514.

NOTE.—The units are sous per pound for bread, pork, and candles and livres per bushel (*septier*) of wheat, per hundred pounds of butter, and per thousand eggs.

* The first market date after each diminution.

TABLE 3
Percentage Changes in Cloth Prices

| | | Price Changes (%) | | |
	ME	Mean	Median	Standard Deviation
Amiens cloth hall (107 cloths), January 1724–October 1724	−40	−25	−25	6.5
Clermont fair (42 cloths), May 1724–August 1724	0	7	5	6.7
St. Germain fair (22 cloths), February 1724–February 1725	−40	−33	−33	6.0

Sources.—AN G/7/97, nn. 242–44 (Amiens); F/12/1376 (Clermont); F/12/1234B (Saint-Germain).

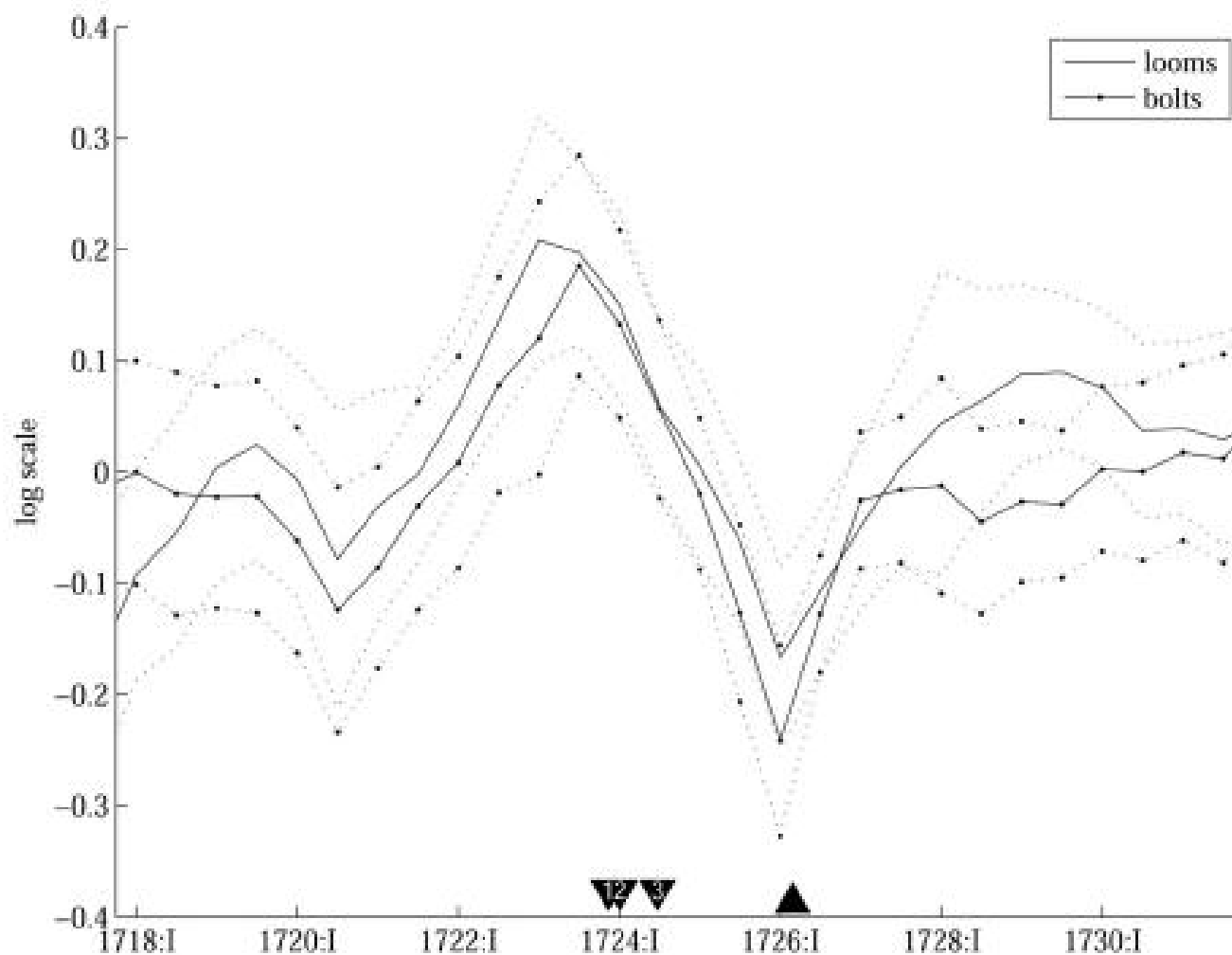From: Velde, "Chronicle of a Deflation Unforetold"

FIG. 11.—Weighted price index of bolts for a subsample of districts, semiannual, 1716–31. Dotted lines are 95 percent confidence intervals.
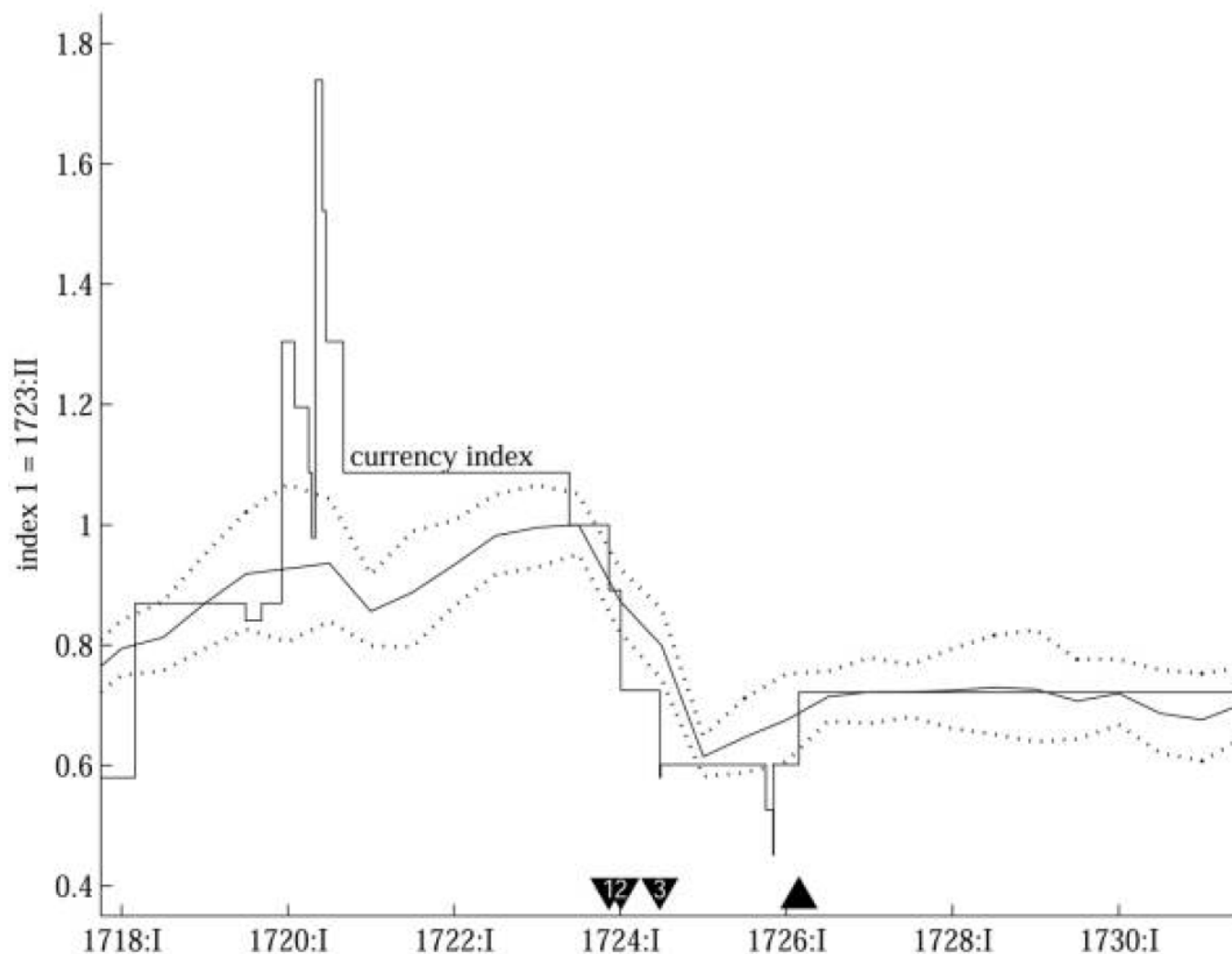
From: Velde, "Chronicle of a Deflation Unforetold"

FIG. 9.—Index of working looms and index of bolts produced, semiannual, 1718–31 (log scale). Dotted lines are 95 percent confidence intervals.

From: Velde, "Chronicle of a Deflation Unforetold"

IV. Richardson and Troost: "Monetary Intervention Mitigated Banking Panics during the Great Depression"
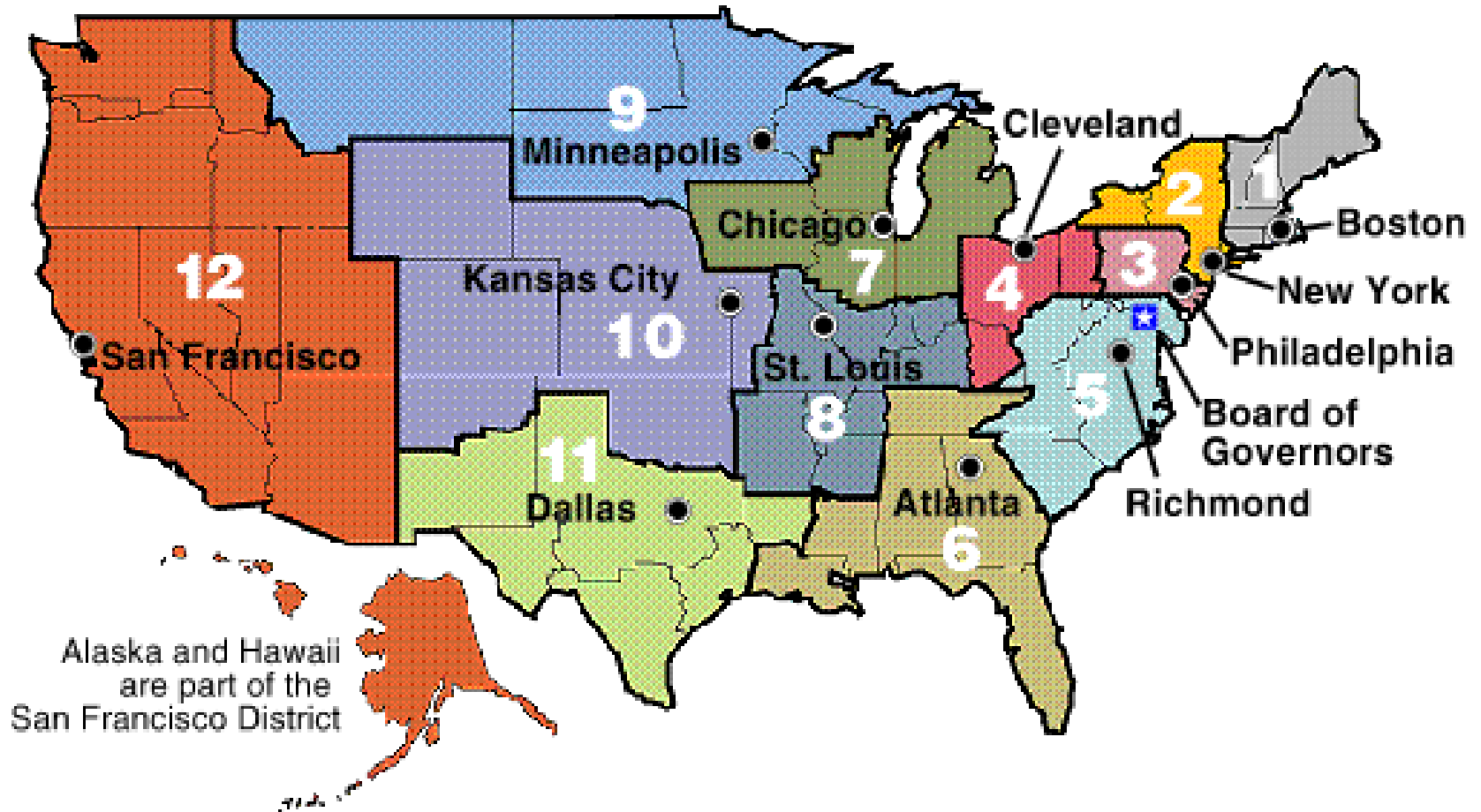
Federal Reserve Districts

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).

NOTE.—The near border columns contain statistics for 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"
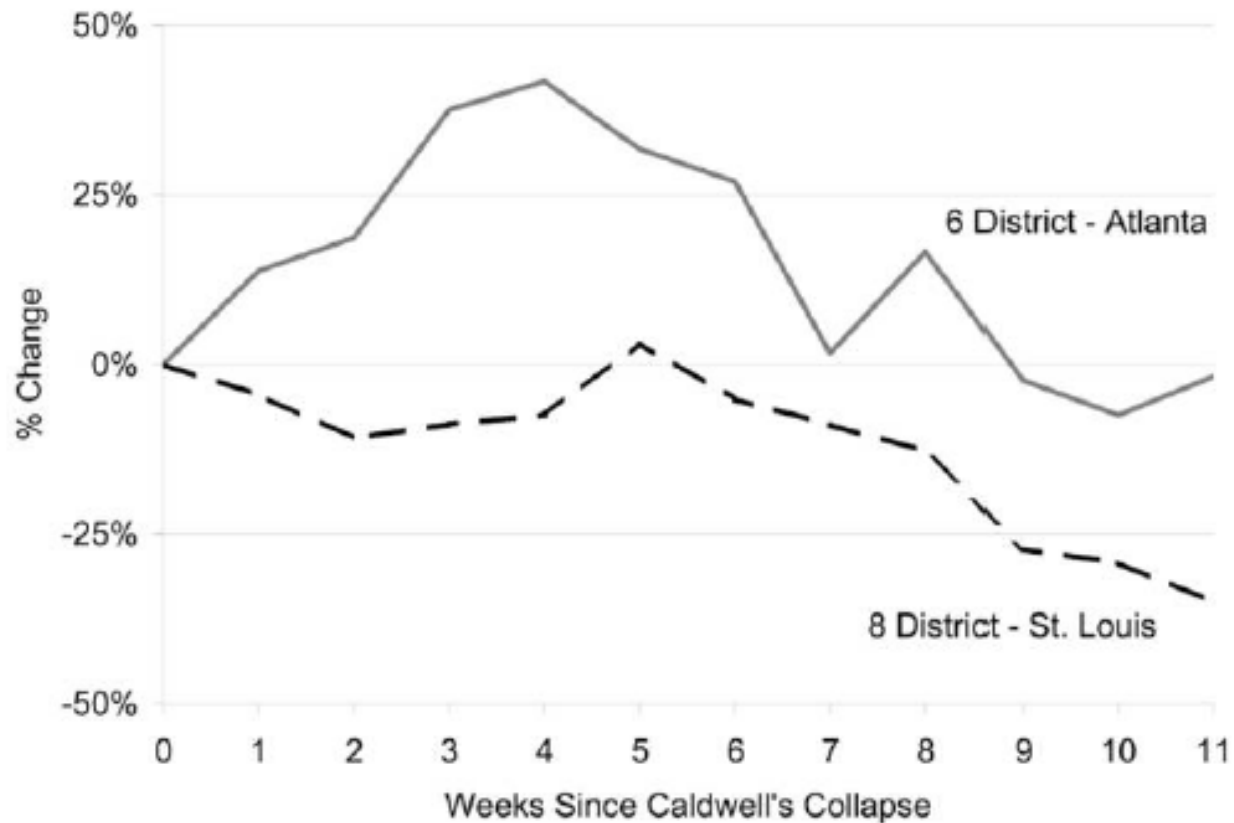
FIG. 2.—Discount response after the collapse of Caldwell, aggregate discounts each week as a percentage of initial level. Source: See Section II.

From: Richardson and Troost, "Monetary Intervention Mitigated Banking Panics"
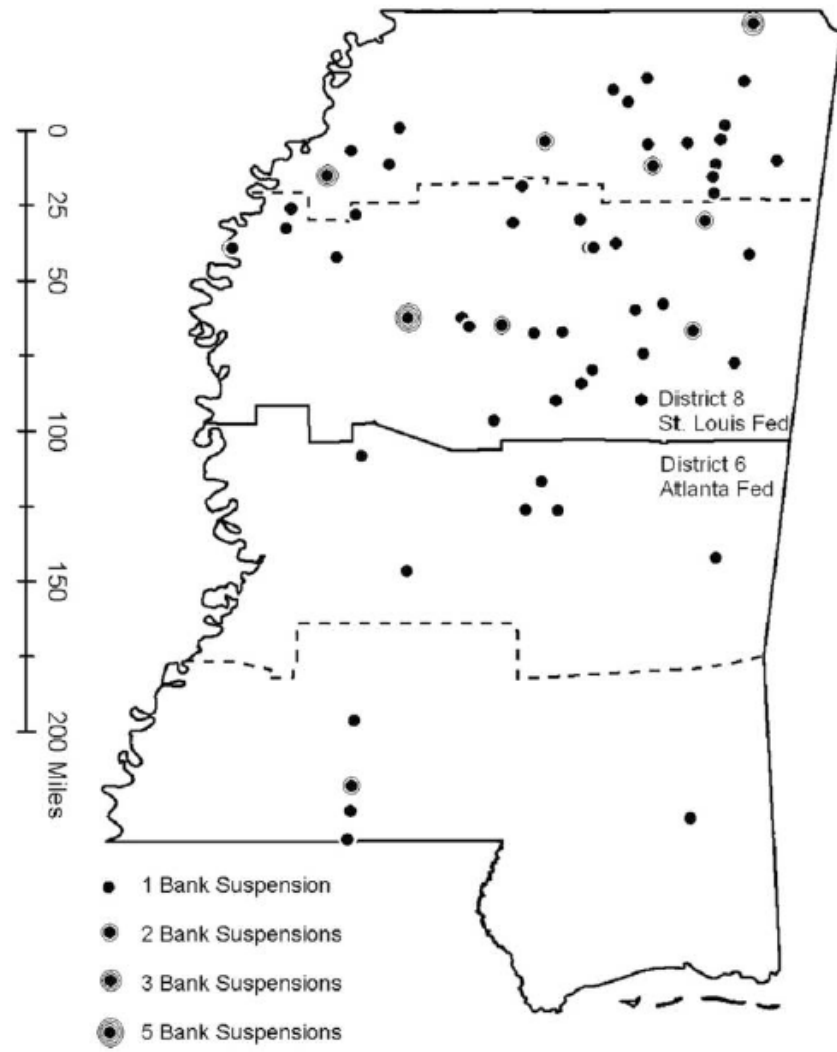
Fig. 1.—Mississippi's division into Federal Reserve districts and bank suspensions between October 1930 and March 1931. Source: See Section II. The solid line represents the Federal Reserve district border. The dotted lines enclose the counties for which at least half the area lies within 1 degree latitude of the district border.

TABLE 4
Bank Suspensions and Liquidations

Begin July 1		End June 30	PERCENTAGE OF BANKS SUSPENDING			PERCENTAGE OF BANKS LIQUIDATING		
				Federal Reserve District			Federal Reserve District	
			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

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

FIG. 4.—Survival and hazard during the post-Caldwell panic, principle nonparametric controls. *A,* Survival within 1 degree latitude of border. *C,* Survival within 50 miles of border. *E,* Survival for banks founded before Fed. *G,* Survival for banks founded after Fed.
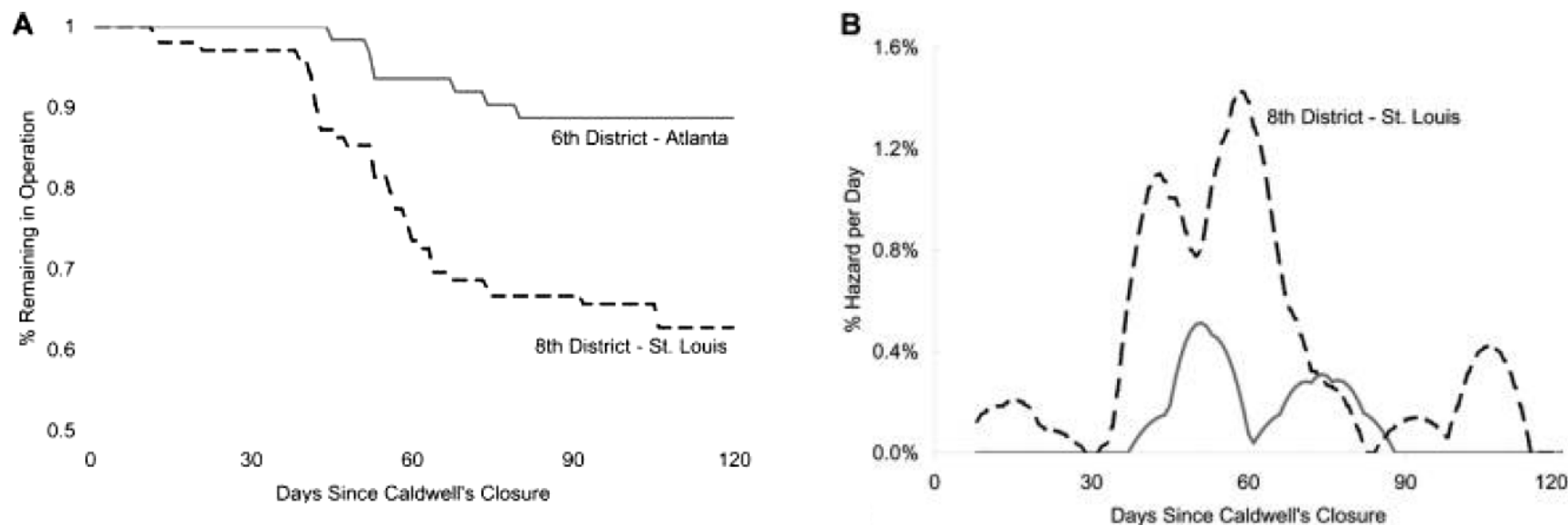

FIG. 4.—Survival and hazard during the post-Caldwell panic, principle nonparametric controls (*continued*). *B,* Hazard within 1 degree latitude of border. *D,* Hazard within 50 miles of border. *F,* Hazard for banks founded before Fed. *H,* Hazard for banks founded after Fed.

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

Table 3 – Panel Regression, Bank Suspension Rates along Atlanta and New York Federal Reserve Borders, 1929-1933

	Coefficient	Standard Error	P-value
Monetary Regime-Year Fixed Effect			
D1929xAtlanta	-0.0651	0.0169	0.0000
D1930xAtlanta	-0.0397	0.0169	0.0190
D1931xAtlanta	-0.0131	0.0169	0.4360
D1932xAtlanta	0.0108	0.0169	0.5210
D1933xAtlanta	0.0082	0.0169	0.6270
D1929xNewYork	-0.0066	0.0276	0.8100
D1930xNewYork	0.0208	0.0276	0.4500
D1931xNewYork	-0.0061	0.0276	0.8240
D1932xNewYork	-0.0090	0.0276	0.7440
D1933xNewYork	0.0072	0.0276	0.7950

From: Andrew Jalil, " Monetary Intervention Really Did Mitigate Banking Panics During the Great Depression"
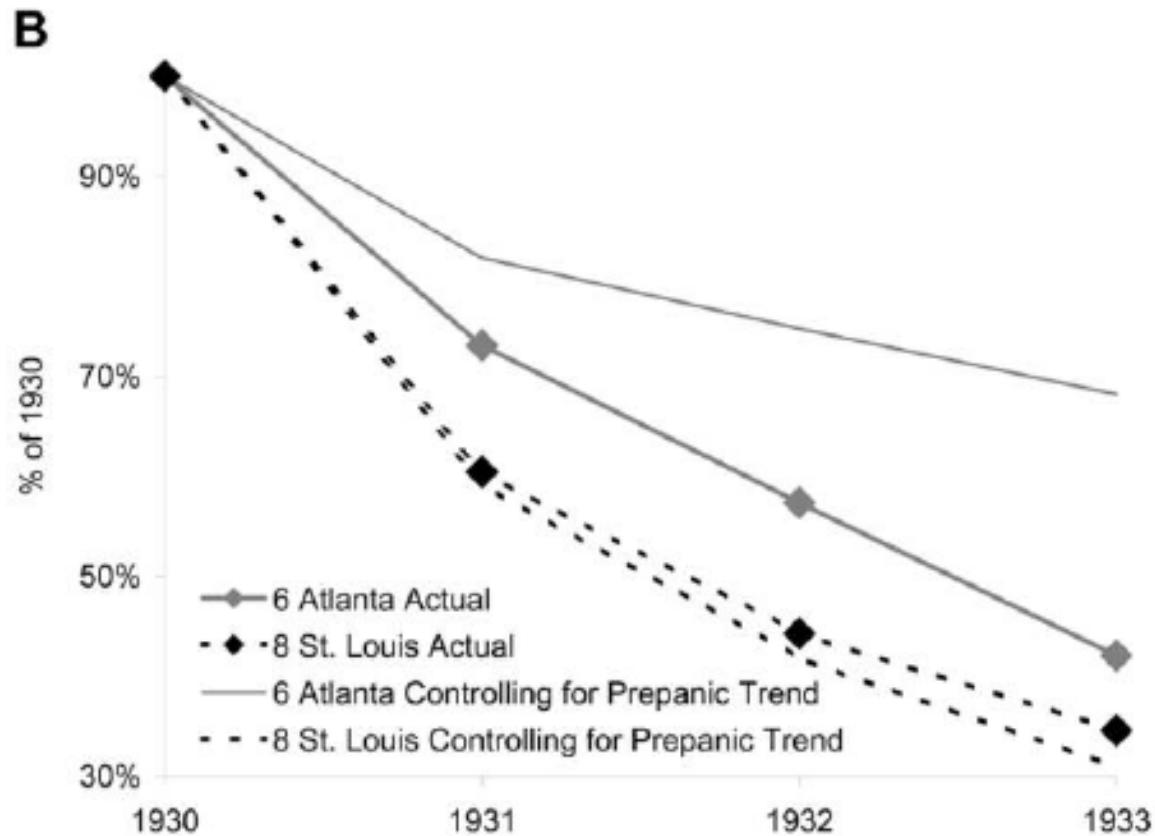
Fig. 6.—Comparing consequences of the banking panics in the 6th and 8th Districts. *A*, Total deposits as a percentage of total deposits in June 1930. *B*, Total loans and discounts as a percentage of the total in June 1930.

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
Δ%	−18.1	−34.7
Net sales:		
$1,000s in 1929	140,776	245,486
$1,000s in 1933	59,513	83,727
Δ%	−57.7	−65.9

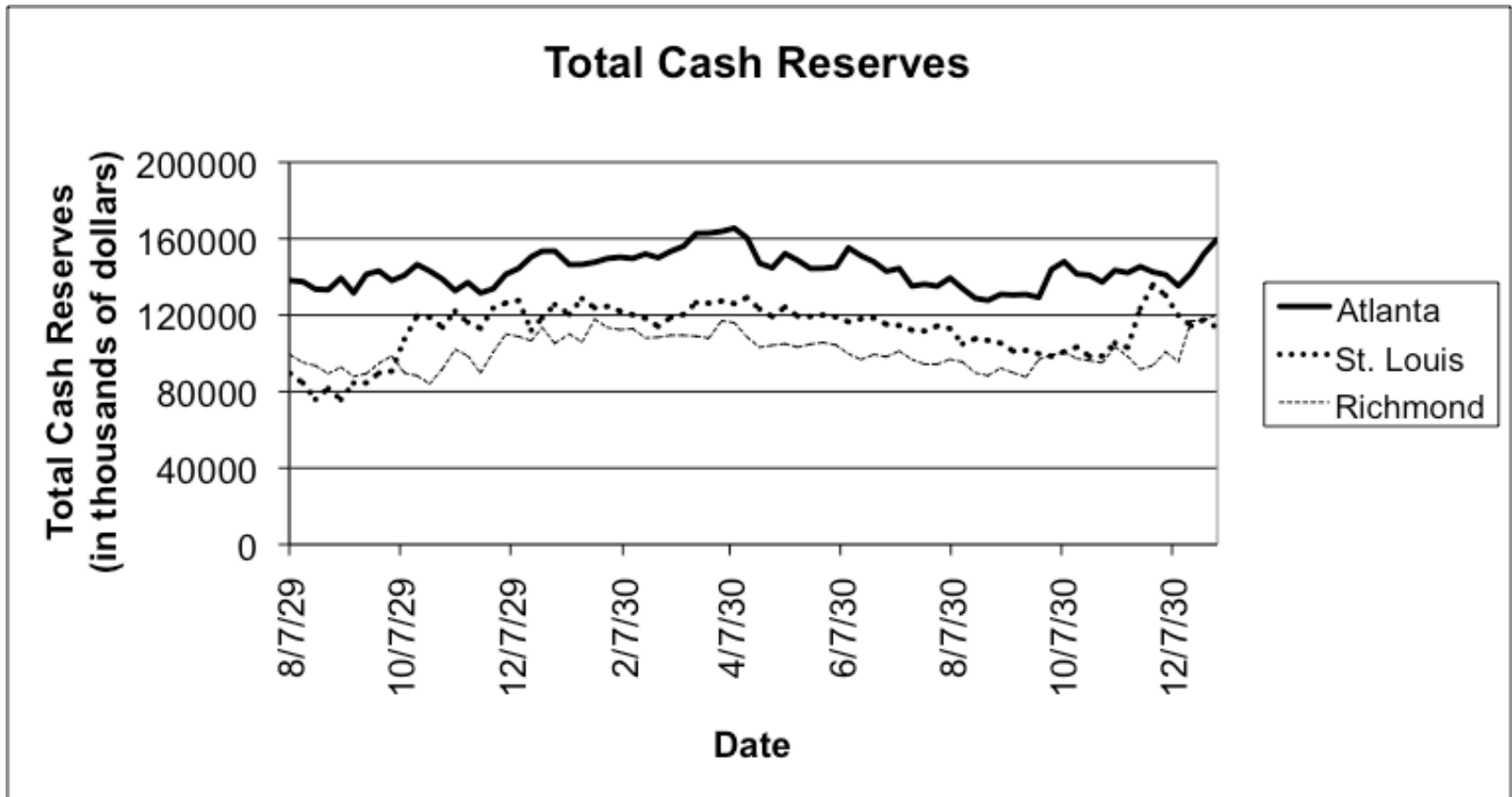SOURCE.— *Census of American Business,* 1929 and 1933.

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

Revenue and Output Consequences of being in the St. Louis Federal Reserve District

	Total Revenue				Physical Output			Price		
	Within	Balanced	Unbalanced	County	Within	Balanced	Unbalanced	Within	Balanced	Unbalanced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
St. Louis Fed 1931	-.16 *	-.24***	-.15*	-.28*	-.37**	-.50**	-.43**	.34*	.35*	.27*
	(.09)	(.09)	(.09)	(.16)	(.17)	(.21)	(.20)	(.21)	(.19)	(.16)
St. Louis Fed	-	-.14	-.17**	-	-	-.16	.39	-	-.14	.18
		(.11)	(.08)	-	(.21)	(.31)	-	(.14)	(.13)	
Year 1931	-.39***	-.44***	-.32***	-.43	.19	.20	.36**	-.53***	-.57***	-.61***
	(.07)	(.06)	(.07)	(.12)	(.12)	(.15)	(.14)	(.12)	(.11)	(.10)
N	1234	636	1227	149	479	282	479	478	281	478
Within R^2	.24	-	-	-	.05	-	-	.11	-	-
Between R^2	.02	-	-	-	.01	-	-	.16	-	-
Overall R^2	.02	.59	.55	.97	.02	.80	.81	.11	.84	.84

Table 3: Regression results comparing 1929 to 1931 along revenue, output and price margins. All dependent variables are in logs. All regressions include industry fixed effects. Note that price and quantity effects are only for firms producing one good. Firm-clustered standard errors are reported in parenthesis. $^*p < .1$, $^{**}p < .05$, $^{***}p < .01$.

From: Nicholas Ziebarth, "Evidence on the Efficacy of Discount Loans for Real Activity during the Great Depression."

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