Liquidity Risk, Bank Networks, and the Value of Joining the Fed

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Question and Finding

- 어떤 은행들이 연방 준비 이사회에 가입하였는가?
- 가입한 은행들의 Asset Portfolio는 어떻게 변하였는가?

✓ 다음 도표에서 가입 여부를 말해줌

	seasonal fluctuations in demand for cash and loans	
	High	Low
유동성 공급자 (liquidity provider)	Y	Y
유동성 수요자 (liquidity user)	Y If they cannot mitigate seasonal fluctuations through their correspondent banks	N

✓ 가입한 은행들은 cash 가 줄고 loan이 들어났다.
✓ 은행 대출이 계절적 요인을 계속적으로 보였는가 아닌 가는 어떤 종류의 은행이었느냐에 따라 달라진다.

Overview

- 연방준비제도(연준)는 거시 건정성 향상을 위해서 만들어 졌다. 특히 과거 통화 수요는 계절적 변통을 보였고 이는 국법은행 시대 은행 도산의 원인이 되었다.

- 1920년 초, 약 1604개의 주법 은행 만이 (주법 은행의 8퍼센트) 연준 멤버가 되기를 원했고 의회는 참여율이 저조한 이유를 조사하기 시작했다. 저조한 참여율은 멤버쉽을 획득하기 위해 지불해야 하는 대가가 크다는 데 있다고 밝혀 내었다 (higher zero-interest reserve requirements and other regulations).

Overview

- 은행이 interbank network 의 어떤 위치에 있는가는 은행이 연준의 멤버가 되는 것에 큰 영향을 미쳤다.
- 연준의 할인창구(discount window)를 직접적으로 이용하거나 이를 이용해서 다른 은행들에게 간접적으로 유동성 (liquidity)을 제공하는 은행들은 연준의 멤버가 되었다.
- 다른 은행들으로부터 유동성을 제공받는 은행들은 연준의 멤버가 되지 않았다.
- 이는 어떤 은행들에게는 연준의 멤버가 되면서 얻는 이득이 손실보다 크다는 것이다—연준의 멤버가 되면서 이들 은행은 유동성 위험이 줄어들게 되었고 이는 다른 은행에 유동성을 제공하며 더 많은 이윤을 창출할 수 있게 해 주었다.

국법 은행 시대 은행 도산

- 국법 은행 시대에 대규모 은행의 도산은 도산한 기업들의 부채가 (seasonally adjusted) 50 % 이상 증가하고 and 주식 가격이 7.9% 이상으로 떨어질 때 일어났다 (Calomiris and Gorton, 1993).
- 대규모 은행 도산은 주로 봄과 가을에 일어났다 (when business cycle decline, failures and asset price declines coincided with high lending and leverage).
- 이는 미국 경제에 그리 큰 영향을 미치지는 아니하였다 (1893 was worst, with 0.1% of failed banks' negative net worth/GDP).

NMC to the Rescue

- NMC 은 세계 각국의 금융제도에 대해 연구했고 미국만이 단일 은행제를 유지하고 있다는 것을 밝혀냈다 (비분산 투자 형태, 공황 발생 후 조직적인 위기 대처 능력 부족, 지방 은행들이 은행 지불 준비금을 피라미드식으로 준비 도시와 중앙 준비도시에 있는 은행들에 비축함으로써 유동성 위기를 극대화 함).
- NBC은 단일 은행제를 철폐하는 것이 정치적으로 불가능하였으므로 연준을 만들어 계절적 수요에 따른 유동성 위기를 극복하려 하였다.
- 계절적 수요에 따른 유동성 위기는 사라졌다 (Miron 1986 and others…).
- 연준은 작은 규모의 금융 위기에 대처하고 유동성 공급량에 의해 금융 위기가 전파되는 것을 막아내는데 효과적이었다.

Fed Flattens Loan Supply
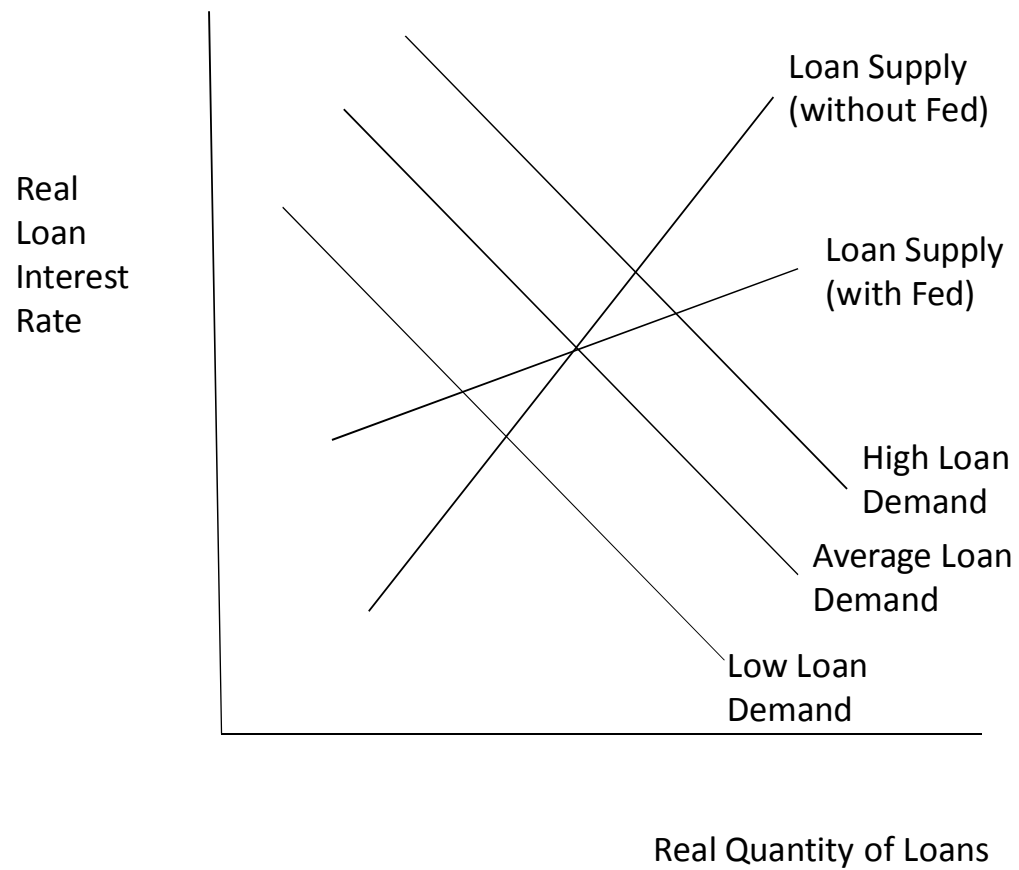
Miron (AER 1986)
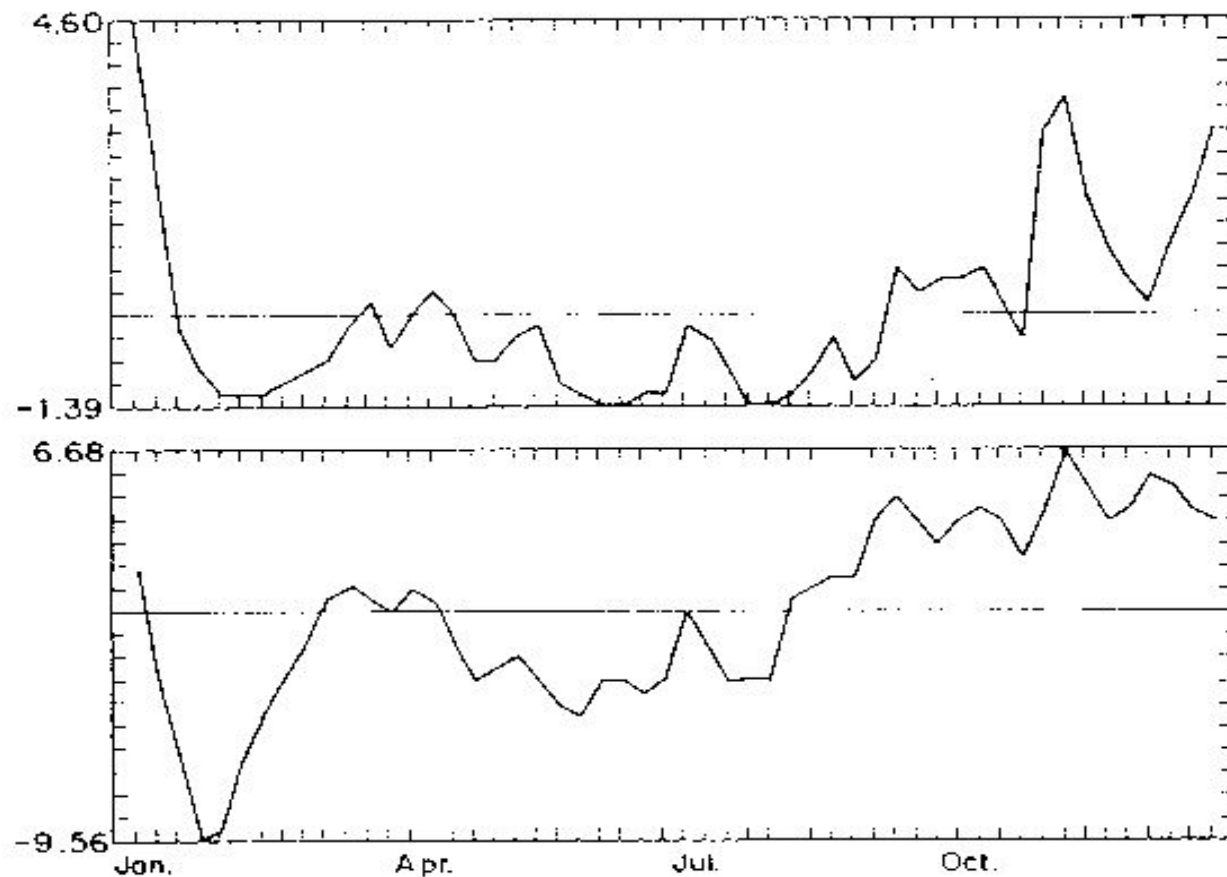
FIGURE 2. SEASONAL PATTERN IN NOMINAL
INTEREST RATE (TOP) AND LOAN-RESERVE
RATIO (BOTTOM) BEFORE 1914
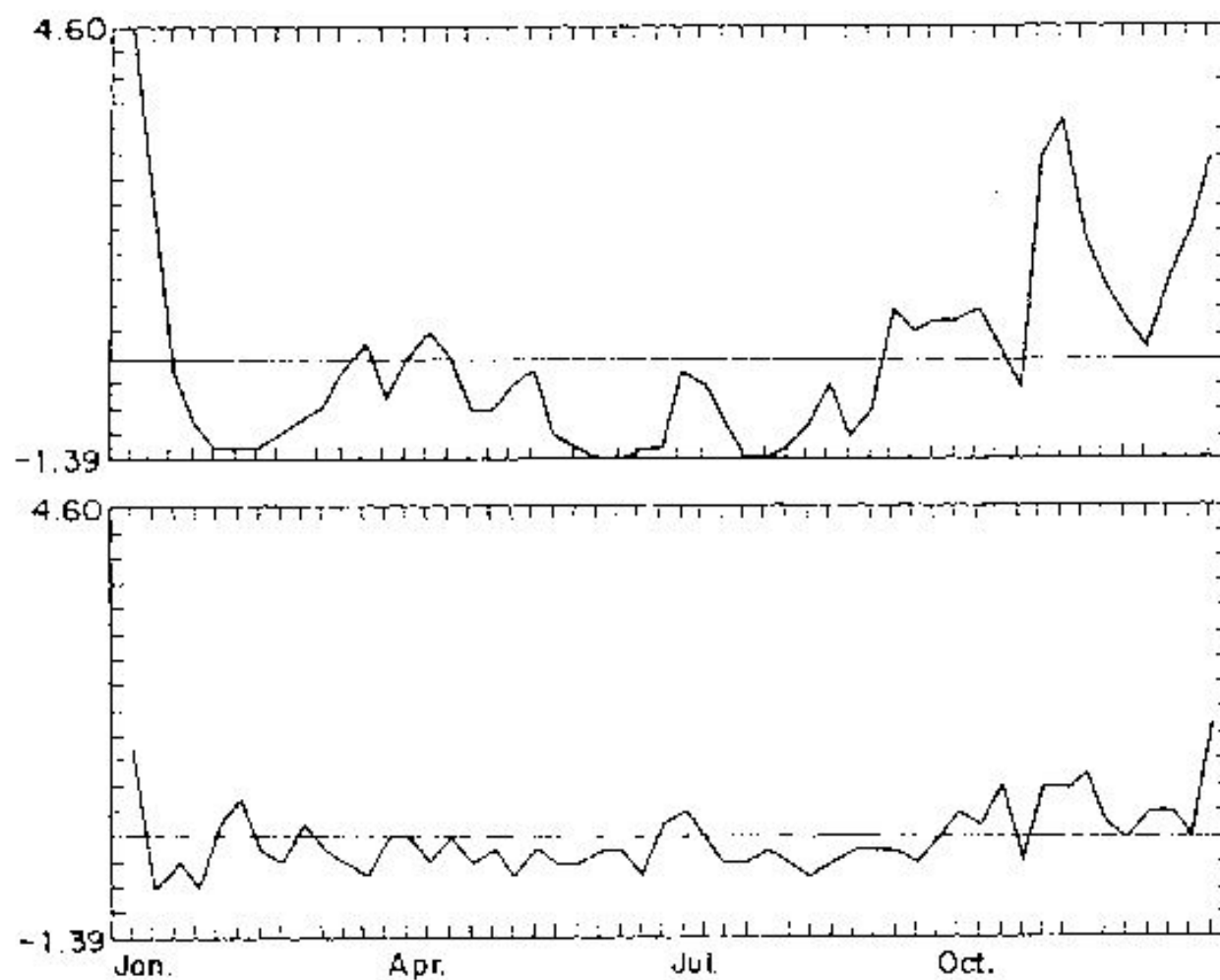
FIGURE 1. SEASONAL PATTERN IN NOMINAL
INTEREST RATES, BEFORE (TOP) AND
AFTER (BOTTOM) 1914
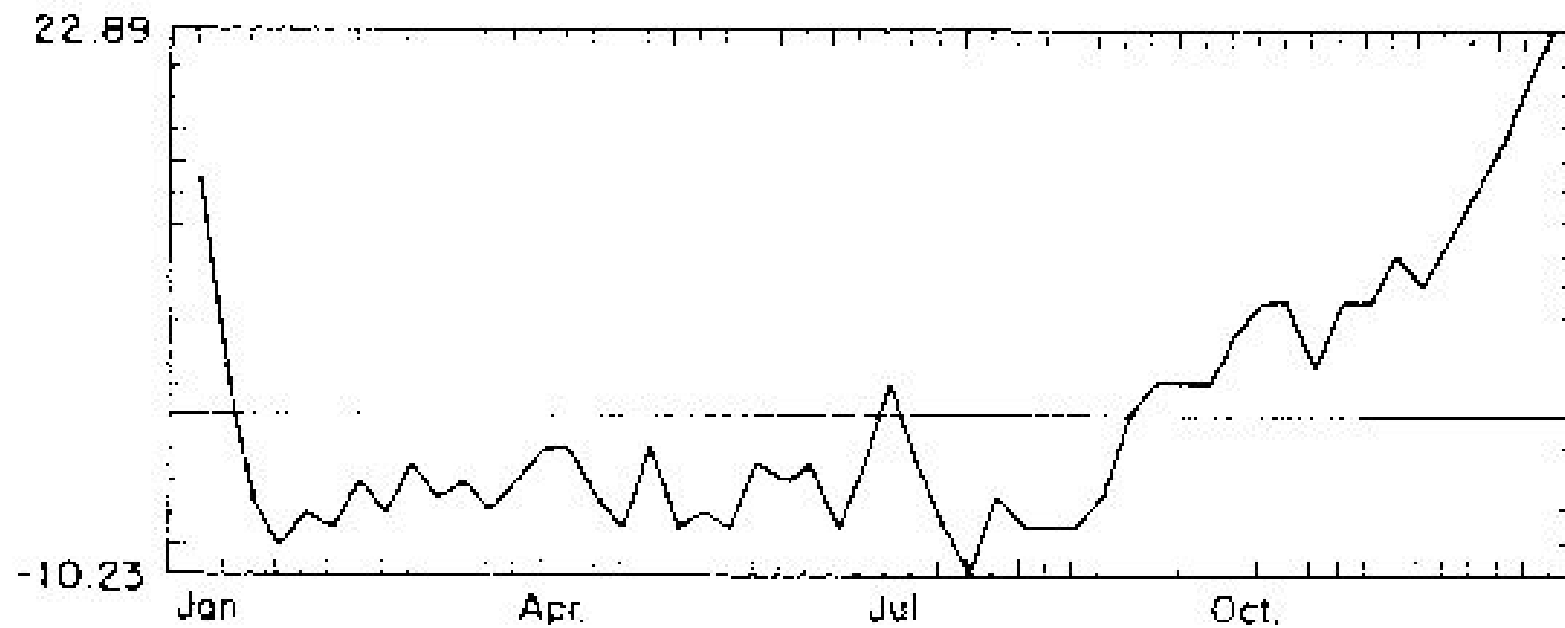
FIGURE 3. SEASONAL PATTERN IN
FEDERAL RESERVE CREDIT OUTSTANDING
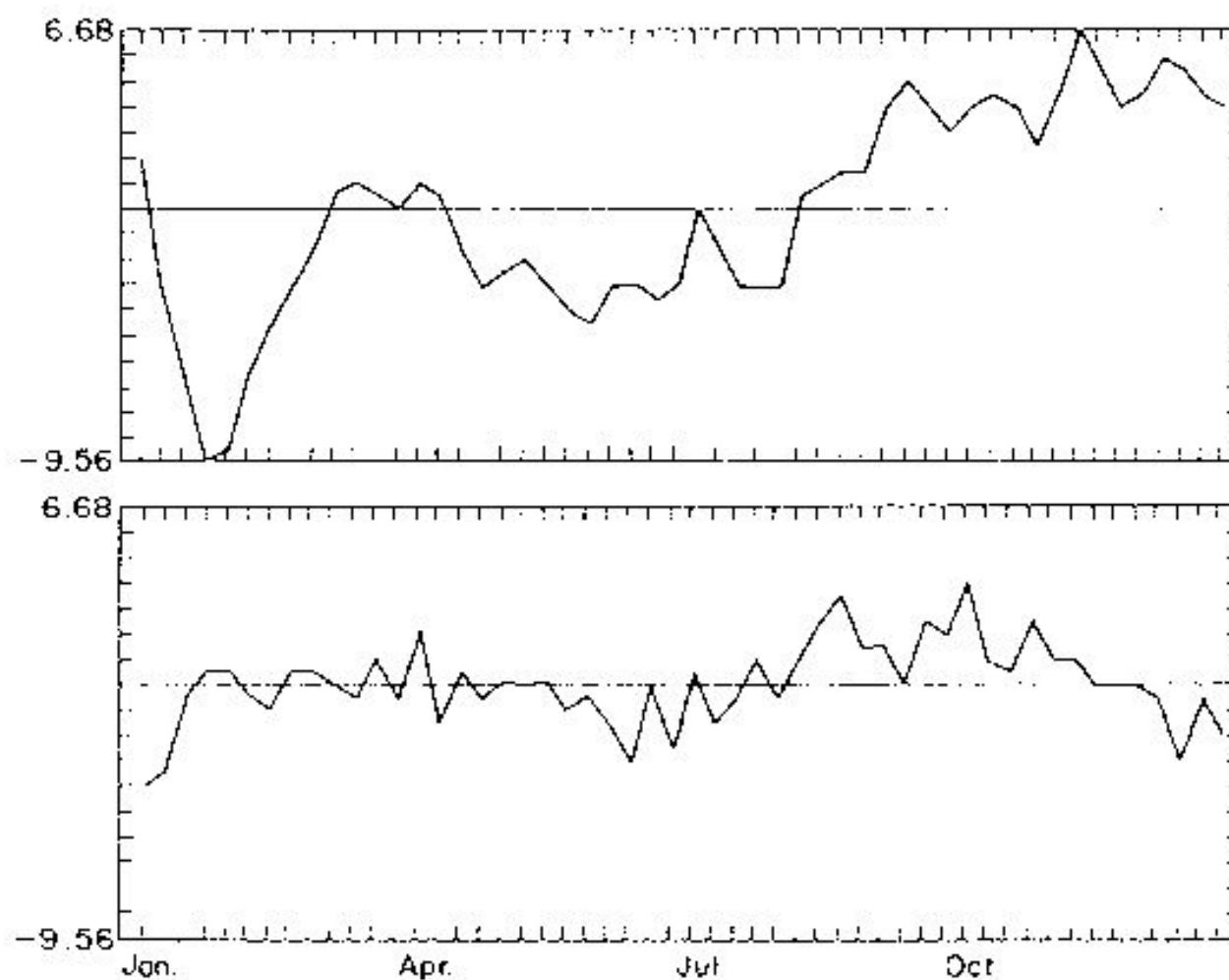
FIGURE 5. SEASONAL PATTERN IN LOAN-RESERVE
RATIO BEFORE (TOP) AND AFTER (BOTTOM) 1914

Bernstein et al. (JFE 2010)

Volatility of Monthly Call Loan Rates
Before & After the Passage of the Aldrich-Vreeland Act

Legend:
- 1870- May 1908
- 1879- May 1908
- June 1908-1925
- June 1908-1913

Y-axis: Average Standard Deviation of Cross-Sectional Monthly Rates (in percent)

X-axis categories: Rest of Year, Sept. & Oct.
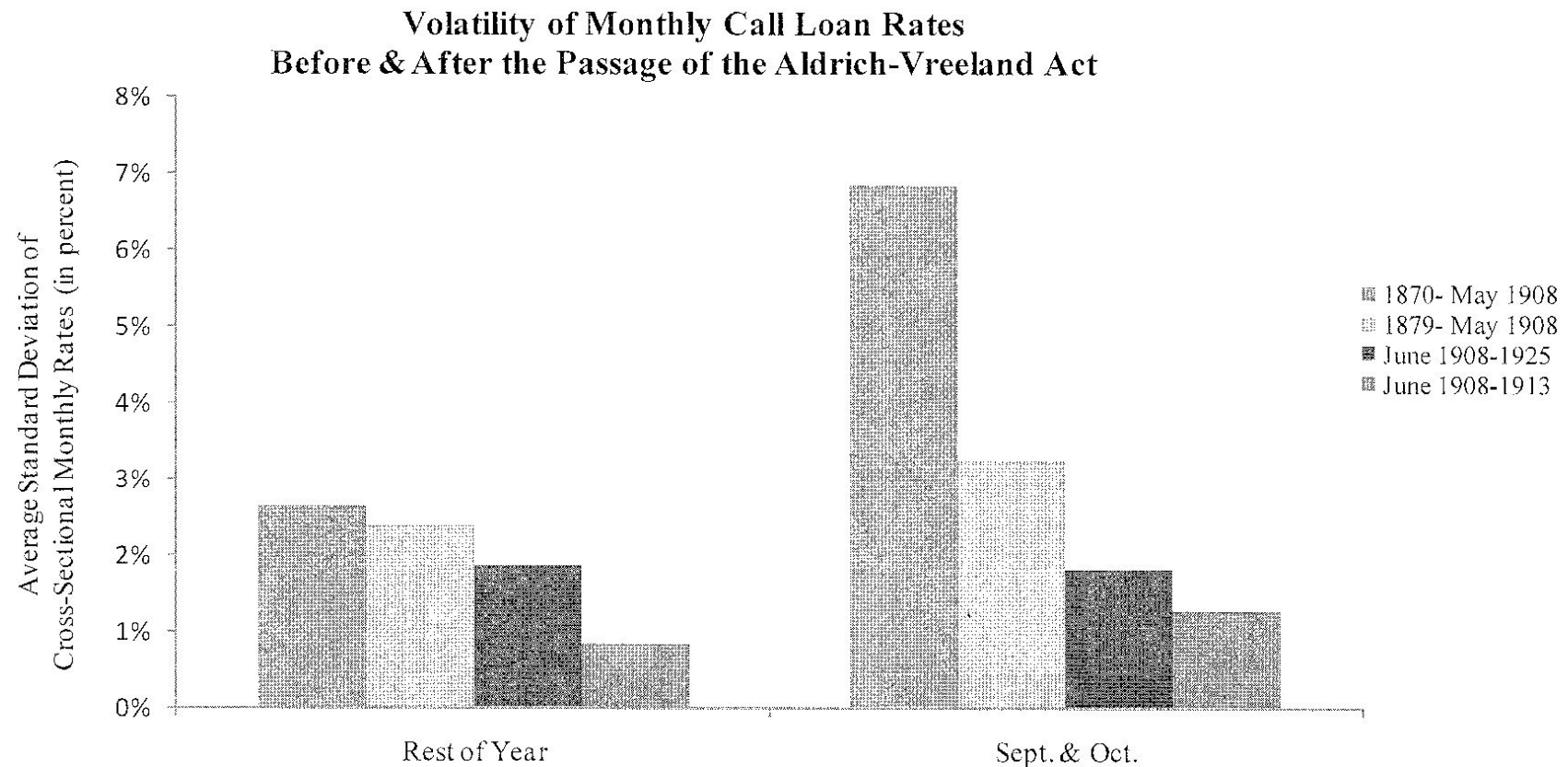
Fig. 3. Call loan interest rate volatility is compared between the months of September and October with the rest of the year for the National Banking Period 1870-May 1908 and the Aldrich-Vreeland (June 1908-1913) and Federal Reserve (June 1908-1925) periods. Call loan interest rate volatility is calculated by computing the standard deviation of interest rates for each month over the relevant sample period. The standard deviation is reported in percent.

Volatilty of Monthly Equal Weight GIP Stock Index Returns Before and After the Passage of the Aldrich-Vreeland Act

Legend:
- 1870- May 1908
- 1879- May 1908
- June 1908-1925
- June 1908-1913

Y-axis: Average Standard Deviation of Cross-Sectional Monthly Returns (in percent)

X-axis categories: Rest of Year, Sept. & Oct.
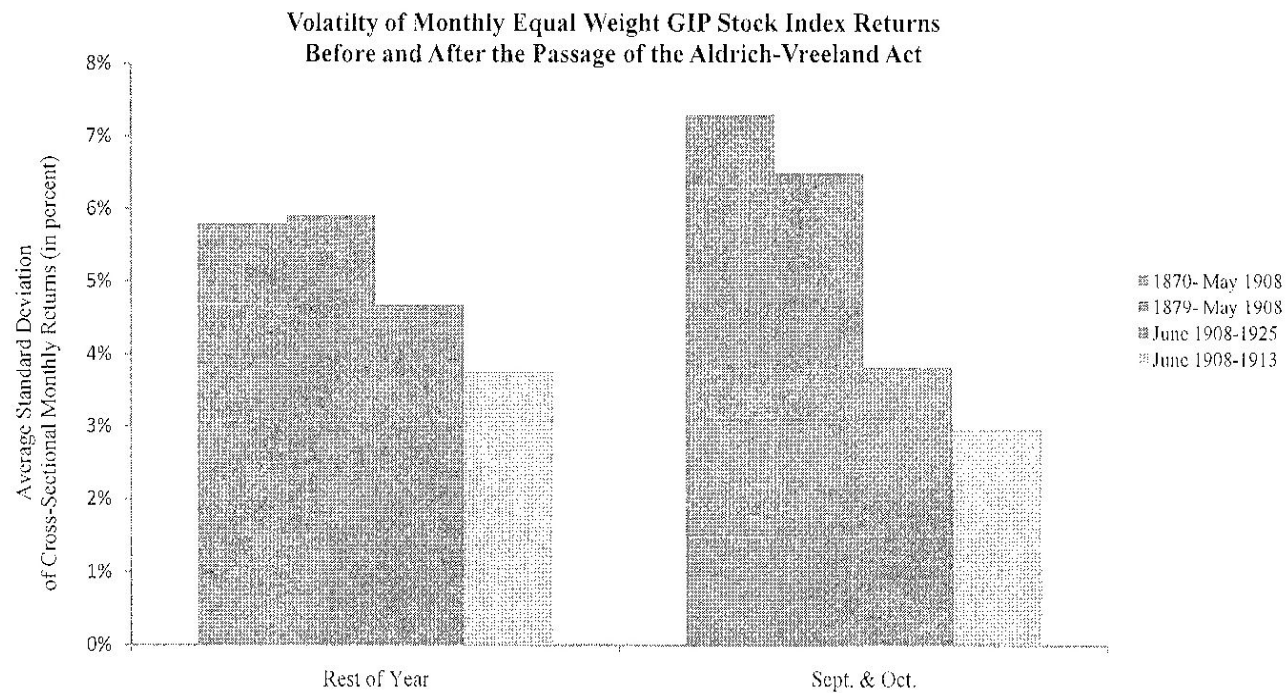
Fig. 4. The volatilities of monthly stock returns are compared over four sub-periods between 1870 and 1925. The standard deviation of stock returns is based on the arithmetic mean of the log of the price relative for the equal weight index over time for a given month. The standard deviation is expressed in percent. The stock data are taken from Goetzmann, Ibbotson and Peng's (2001) database on historical stock prices.

거시 건전성

- 국법 은행들은 지급 준비금을 만족해야 했는데 중앙 준비 도시와 준비 도시에 있는 은행들은 지방 도시에 있는 은행에 비해 더 많은 양의 준비금을 비축해야 했다. 이는 네트워크 내에서의 유동성 위험에 노출된 정도를 보여준다.
- 연준은 거시 건전성을 향상시키기 위한 제도였다.
- 예금 보호 제도가 없던 이 시기에 은행 규제는 거시 건전성을 위해서 이루어 졌다.

왜 연준에 가입하지 않았는가?

- 제로 금리 지급 준비금 제도 (fed에 지급 준비금을 맡겨둔 경우)
- Par clearing requirement
- Other regulations.
- 간접적으로 연준의 할인 창구를 이용할 수 있었다.
- 이는 "그림자 은행들 (shadow banks)"과 비슷하다. 이들은 은행 규제를 피하면서도 정부의 안전망을 이용하려 했다.

Table 1: 지급 준비금, New York State Fed Member and Nonmember Banks In 1915

	State Members	State Nonmembers
Reserves against Deposits	If in a central reserve city: 18% demand deposits and 5% time deposits with at least 6/18 on hand and at least 7/18 at Fed	In Manhattan: 25% of demand deposits with at least 3/5 on hand and rest on deposit with large reserve city bank
	If in a reserve city: 15 % demand deposits and 5% time deposits with at least 5/15 on hand and at least 6/15 at Fed	In Brooklyn: 20% of demand deposits with at least 1/2 on hand and rest on deposit with large reserve city bank
	If not in a reserve or central reserve city: 12% demand deposits and 5% time deposits with at least 4/12 on hand and at least 5/12 at Fed	If not in Manhattan or Brooklyn: 15% of demand deposits with at least 2/5 on hand and rest on deposit with large reserve city bank

Reserve Req Gain from Not Joining

ResReqGain

	1917	1920
Members	2.21%	-1.15%
Non-Members	4.00%	0.86%

Table 1: Capital Requirements, New York State Fed Member and Nonmember Banks In 1915

	State Members	State Nonmembers
Capital Stock	Town Population more than 50,000: $200,000	Town Population over 30,000 : $100,000
	Town Population greater than 6,000 but less than 50,000: $100,000	Town Population greater than 2,000 and less than 30,000 : $50,000
	Town Population greater than 3,000 but less than 6,000: $50,000	Town Population less than 2,000 : $25,000
	Town Population less than 3,000: $25,000	

왜 연준에 가입하였는가?

- 할인 창구의 이용이 가능해짐에 따라서 유동성 위험이 완화됨 (war bonds exception; 1914-1921 incidental eligible paper exception, but with a fee from a member bank; removed incidental clause 1921- 1923; 1923 pass through was prohibited).

- 중개 은행으로 나설 수 있는 새로운 기회 제공.

- 다른 장점 들 (rapid check clearing, access to government business, zero cost on currency shipments).

Why Study New York State?

- Best to look at one state at a time (reg diffs).
- New York is important, diverse, and has many banks.
- New York has the main central reserve city (NYC).
- We limit sample period to 1914-1920 (only one joins in 1921-1924; also rules for pass-through change).

Table 2: Summary Statistics of NY Banks in 1915

	Listed As Correspondent of State Bank		Not Listed As Correspondent of State Bank		Became Member	Did Not Become Member
	NYC	Non-NYC	NYC	Non-NYC		
# of Banks	19	9	32	172	74	158
% Fed Member by 1920	78.9%	44.4%	56.3%	21.5%	100.0%	0.0%
Years Until Fed Member	3.0	4.8	4.4	5.4	2.9	6.0
% Trust Companies	63.2%	44.4%	31.3%	22.1%	48.6%	17.7%
% Clearing house Members	**57.9%**	**88.9%**	37.5%	4.7%	**35.1%**	**8.2%**
Distance to Reserve City	**1**	**220**	1	175	**93**	**159**
Assets/Assets in Fed Banks Within 25 Mls	3.7%	13.4%	0.5%	6.9%	6.6%	5.7%
County Population	**5,620,048**	**414,686**	5,620,048	137,333	**1,459,215**	**463,251**
% Urban	100.0%	85.9%	100.0%	49.0%	76.8%	54.5%
# of Due from Correspondents	3.6	3.7	3.6	2.6	3.5	2.6
Share of Due From Corresp. In Manhattan	32.5%	41.1%	45.5%	58.5%	41.7%	54.2%
# of Due to Correspondents in New York	**4.9**	**3.0**	0.0	0.0	**1.3**	**0.2**
Due From Banks in 1914	6,164,052	761,280	938,752	138,904	1,931,419	221,361
Due From/Assets in 1914	9.1%	10.2%	9.1%	10.8%	9.3%	10.9%
Due to Banks in 1914	**6,202,704**	**345,757**	215,636	12,809	**1,640,223**	**55,001**
Due to/Assets in 1914	**8.7%**	**3.8%**	1.0%	0.6%	**2.8%**	**0.8%**
Due to Banks + Due From Banks in 1914	12,400,000	1,107,038	1,154,387	151,713	3,571,642	276,363
Due to/(Due to banks + due from banks)	**42.9%**	**22.6%**	9.7%	4.8%	**16.5%**	**5.9%**
Assets in 1914	**69,381,593**	**7,254,469**	11,217,858	1,496,527	**21,785,822**	**2,454,201**
Loans/Assets in 1914	54.1%	58.2%	53.7%	57.8%	53.4%	58.6%
Percentage Loan Swing Q3-Q4 1912-1914	15.7%	9.7%	8.6%	7.0%	**10.6%**	**6.9%**
Median Assets in 1914	56,500,000	7,294,887	5,721,910	606,623	5,445,208	681,979

Figure 2: Geographic Distribution of State Member Banks Before 1924
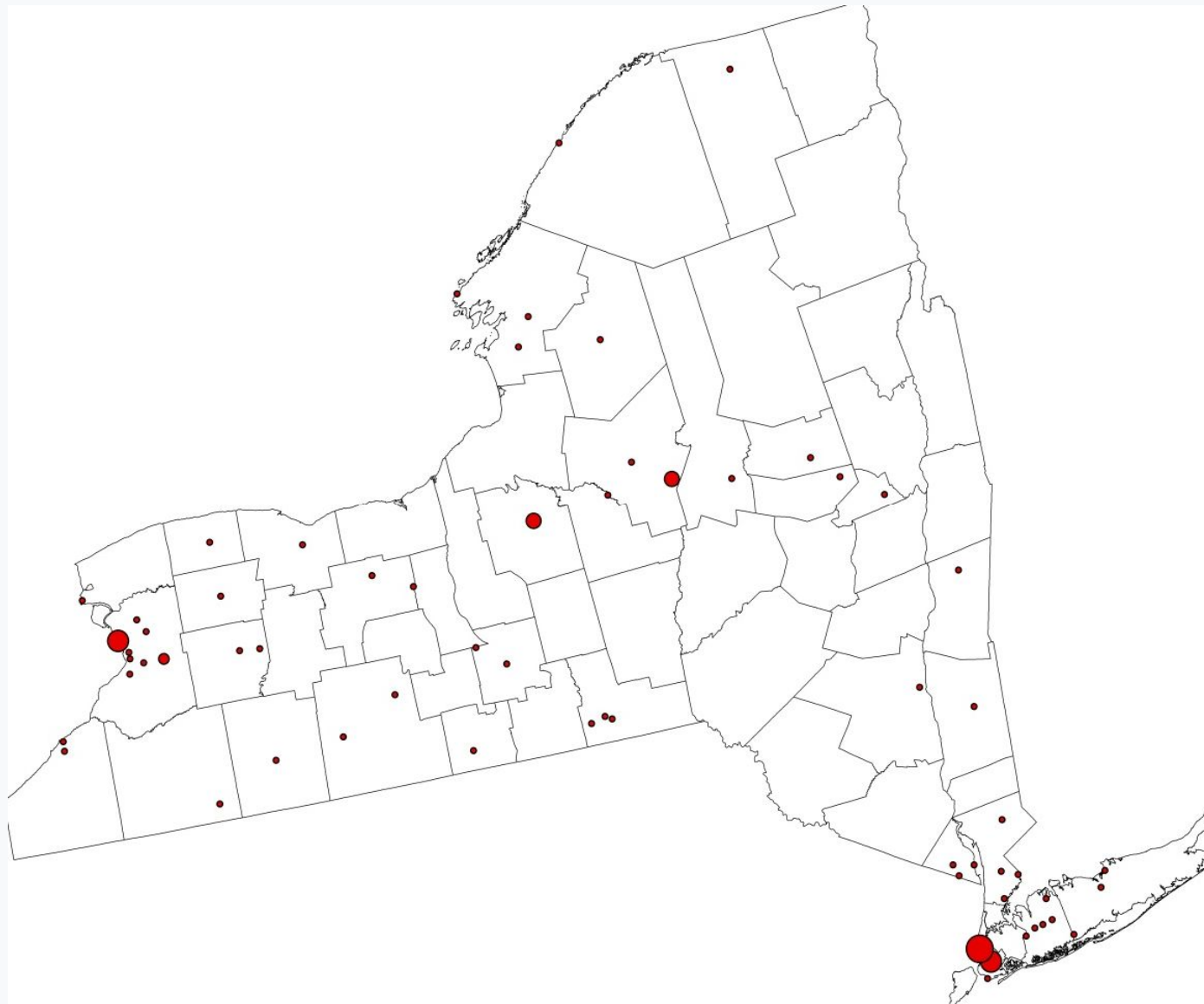
Table 3: LogLogistic Survival Model of Determinants of Joining the Fed (1915-1920)

	Dependent Variable = Became Fed Member In Following Year					
	(1)	(2)	(3)	(4)	(5)	(6)
Trust Company			-0.360***	-0.446***	-0.215*	**-0.250***
			[0.114]	[0.131]	[0.125]	[0.152]
Clearing house Member			-0.300**	-0.585***	-0.177	**-0.418****
			[0.140]	[0.193]	[0.133]	[0.171]
Distance to Nearest Fed	0.002**	-0.002	0.001*	-0.002	0.001	-0.002
City	[0.001]	[0.002]	[0.001]	[0.002]	[0.001]	[0.001]
Ln(Assets in Fed Banks	-0.009	0.130*	0.005	0.145**	0.050	**0.197***
Within 25 Miles)	[0.052]	[0.077]	[0.050]	[0.062]	[0.054]	[0.058]
Assets/Assets in Fed	-1.331**	-1.633**	-0.379	-0.020	0.564	2.036*
Banks Within 25 Miles	[0.529]	[0.704]	[0.629]	[0.741]	[0.806]	[1.130]
# of Due from Correspondents	-0.027	-0.025	0.014	0.037	0.006	0.025
	[0.021]	[0.031]	[0.028]	[0.041]	[0.028]	[0.039]
Share of Due From Corresp.	0.316*	0.604**	0.318*	0.487**	0.311*	**0.410***
in Manhattan	[0.164]	[0.261]	[0.171]	[0.234]	[0.163]	[0.226]
Any Due to Correspondents	-0.195*	-0.282*	-0.049	-0.038	0.080	0.272
	[0.107]	[0.169]	[0.111]	[0.138]	[0.126]	[0.168]
Ln(Assets in 1914)					-0.149***	**-0.282****
					[0.058]	[0.084]
Avg Loans/Assets 1912-1914					0.439	-0.093
					[0.413]	[0.535]
Avg Percentage Loan					-0.614**	**-1.082****
Swing Q3-Q4 1912-1914					[0.284]	[0.314]
County Values in 1920	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	1,162	826	1,162	826	1,162	826

Robustness

- Drop due-to banks
- Drop NYC banks
- Logic rather than survival model

Table 4: LogLogistic Survival Model of Joining Fed For Banks Not Listed as Correspondent (1915-1920)-rb

	Dependent Variable = Became Fed Member In Following Year					
	(1)	(2)	(3)	(4)	(5)	(6)
Trust Company			-0.440***	-0.419**	-0.322*	-0.249
			[0.157]	[0.189]	[0.178]	[0.203]
Clearing house Member			-0.260	-0.548**	-0.125	-0.380
			[0.199]	[0.247]	[0.200]	[0.232]
Distance to Nearest Fed City	0.002**	-0.002	0.001	-0.002	0.001*	-0.002
	[0.001]	[0.002]	[0.001]	[0.002]	[0.001]	[0.002]
Ln(Assets in Fed Banks within 25 Mls)	-0.001	0.127*	0.013	0.138**	0.052	**0.185*****
	[0.057]	[0.071]	[0.054]	[0.063]	[0.059]	[0.062]
Assets/Assets in Fed	-1.501**	-1.306*	-0.684	-0.099	0.051	1.548
Banks Within 25 Miles	[0.617]	[0.776]	[0.665]	[0.846]	[0.829]	[1.193]
# of Due from Correspondents	-0.050	-0.056	0.009	0.029	0.015	0.035
	[0.039]	[0.058]	[0.051]	[0.068]	[0.051]	[0.060]
Share of Due From Corresp. in Manh.	0.333	0.633*	0.390	0.561*	0.435*	**0.576***
	[0.236]	[0.337]	[0.248]	[0.312]	[0.245]	[0.317]
Ln(Assets in 1914)					-0.137*	**-0.257*****
					[0.075]	[0.097]
Avg Loans/Assets 1912-1914					0.497	-0.020
					[0.536]	[0.637]
Avg Perc Loan Swing Q3-Q4 1911-14					-0.651*	**-1.115*****
					[0.369]	[0.389]
County Values in 1920	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	1,057	727	1,057	727	1,057	727

Table 5: LogLogistic Survival Model of Joining Fed For Banks Not in Manhattan (1915-1920)-rb

	Dependent Variable = Became Fed Member In Following Year					
	(1)	(2)	(3)	(4)	(5)	(6)
Trust Company			-0.530***	-0.572***	-0.434**	**-0.522*****
			[0.151]	[0.161]	[0.180]	[0.181]
Clearing house Member			-0.300	-0.703**	-0.132	-0.422
			[0.241]	[0.308]	[0.260]	[0.326]
Distance to Nearest Fed City	0.001	-0.002	0.000	-0.002	0.000	-0.002
	[0.001]	[0.002]	[0.001]	[0.001]	[0.001]	[0.001]
Ln(Assets in Fed Banks within 25 Mls	-0.012	0.101	0.011	0.132**	0.043	**0.177*****
	[0.057]	[0.068]	[0.054]	[0.059]	[0.061]	[0.065]
Assets/Assets in Fed within 25 Mls	-1.086	-0.895	0.031	0.846	0.447	2.213*
	[0.706]	[0.734]	[0.821]	[0.841]	[0.982]	[1.323]
# of Due from Correspondents	-0.130***	-0.181***	-0.073*	-0.088	-0.064	-0.076
	[0.037]	[0.068]	[0.044]	[0.062]	[0.056]	[0.067]
Share of Due From Corresp in Manh.	0.109	0.159	0.345	0.396	0.395	0.472
	[0.336]	[0.479]	[0.325]	[0.387]	[0.324]	[0.375]
Any Due to Correspondents	-0.093	-0.092	0.114	0.260	0.057	0.284
	[0.219]	[0.266]	[0.224]	[0.225]	[0.219]	[0.249]
Ln(Assets in 1914)					-0.085	-0.192
					[0.095]	[0.126]
Avg Loans/Assets 1912-1914					0.823	0.343
					[0.567]	[0.623]
Avg Perc Loan Swing Q3-Q4 1911-14					-0.546	**-1.069*****
					[0.406]	[0.404]
County Values in 1920	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	1,004	668	1,004	668	1,004	668

Table 7: Logit Regression of Determinants of Joining the Fed Using 1915 Cross-section-rb

	Dependent Variable = Became Fed Member By 1920					
	(1)	(2)	(3)	(4)	(5)	(6)
Trust Company			**1.211***	**1.157**	0.852	0.587
			[0.459]	[0.525]	[0.525]	[0.557]
Clearing house Member			0.691	1.308*	-0.062	0.223
			[0.578]	[0.728]	[0.631]	[0.774]
Distance to Nearest Fed	-0.006	-0.016	-0.005	-0.017	-0.005	-0.022
City	[0.004]	[0.027]	[0.004]	[0.027]	[0.004]	[0.027]
Ln(Assets in Fed Banks	0.117	-0.050	0.044	-0.168	-0.145	**-0.569***
Within 25 Miles)	[0.152]	[0.233]	[0.154]	[0.220]	[0.195]	[0.299]
Assets/Assets in Fed	4.023**	3.731	1.390	0.224	-2.548	**-10.289****
Banks Within 25 Miles	[1.795]	[2.462]	[2.065]	[2.769]	[3.037]	[4.933]
# of Due from Correspondents	0.128	0.178	-0.001	0.012	-0.040	-0.036
	[0.107]	[0.150]	[0.124]	[0.185]	[0.134]	[0.193]
Share of Due From Corresp.	**-1.164**	**-1.217***	**-1.390**	-1.281	**-1.657**	**-1.595***
in Manhattan	[0.593]	[0.677]	[0.697]	[0.798]	[0.751]	[0.931]
Any Due to Correspondents	0.700	0.985*	0.274	0.459	-0.330	-0.918
	[0.501]	[0.557]	[0.558]	[0.600]	[0.680]	[0.890]
Ln(Assets in 1914)					**0.779***	**1.431***
					[0.295]	[0.500]
Avg Loans/Assets 1912-1914					-1.019	-0.620
					[1.537]	[1.790]
Avg Percentage Loan					**5.694***	**8.291**
Swing Q3-Q4 1912-1914					[2.166]	[3.375]
County Values in 1920	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes
Observations	232	170	232	170	232	170

Timing Differences

- Key banks in correspondent network (Clearing house members, Trusts, large banks in nodal cities) joined immediately.

- Others joined later.

- Note change in distance coefficient over time.

Figure 4: Locations of Receiving Correspondent Banks In Sample
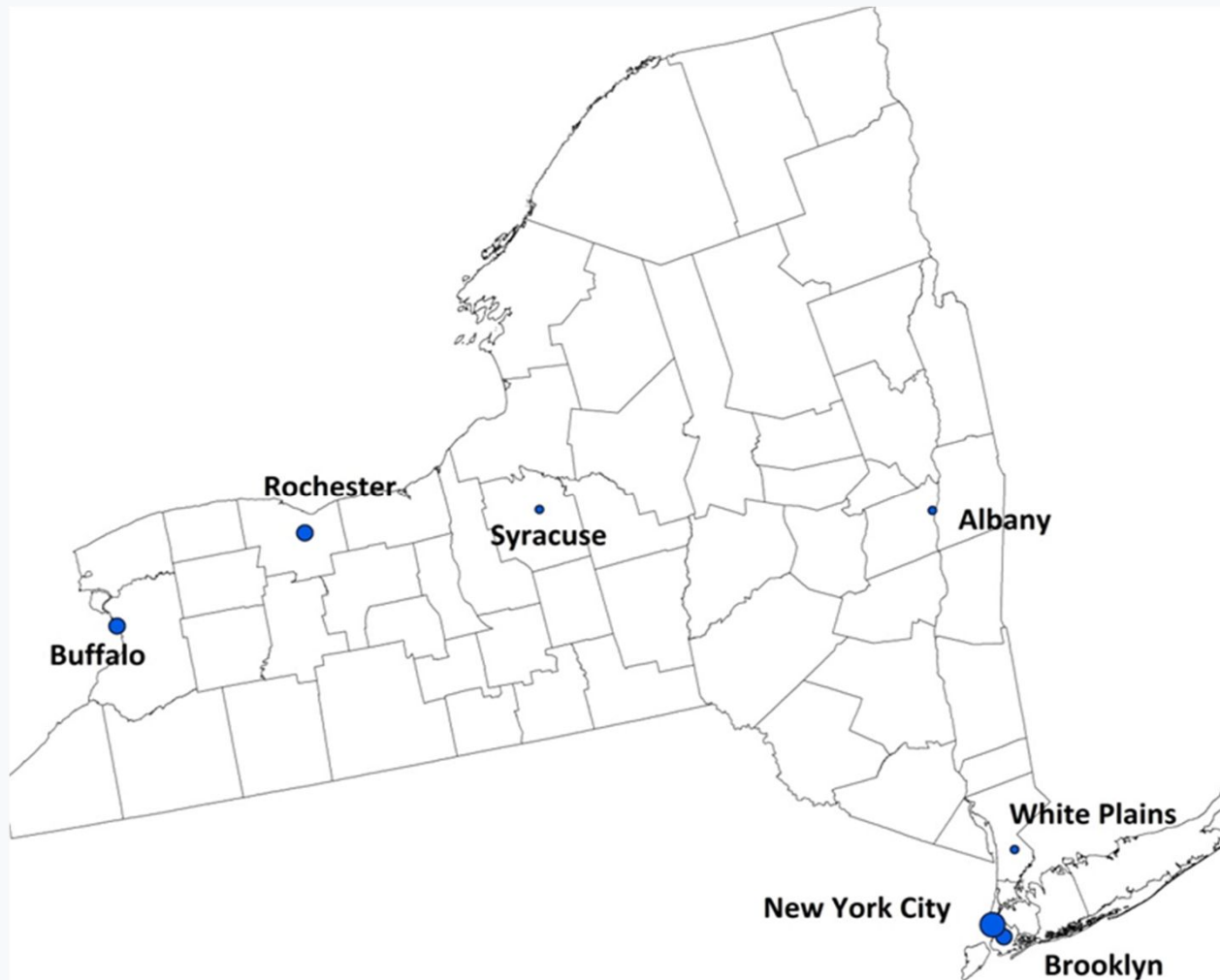
Figure 3: Locations of New Fed Members In Sample By Year (1916-1919)
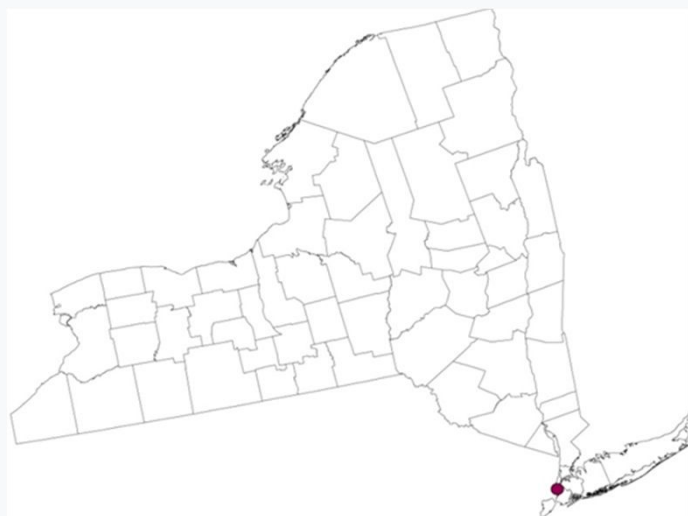
1916	1917
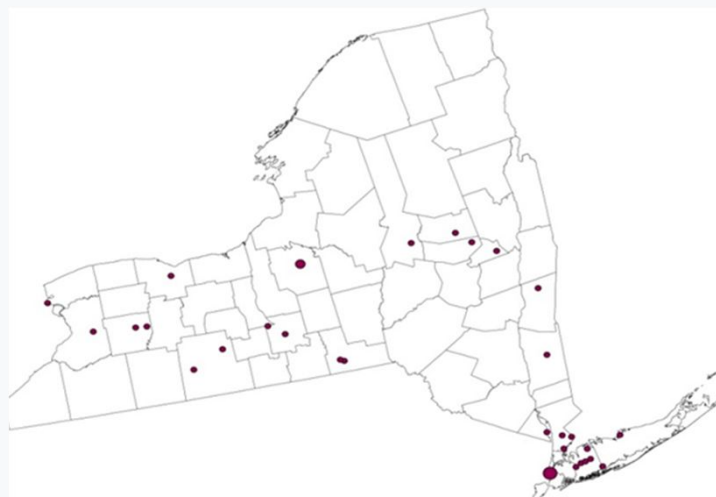
1918	1919

Table 6: Cross-Section Logits Using Initial Values (i.e., for 1915/1916, it would be values for 1915)

| | Dependent Variable = Became Fed Member In Specified Year | | | | | |
| | 1915/1916 | | 1917 | | 1918/1919/1920 | |
	(1)	(2)	(1)	(2)	(1)	(2)
Trust Company	2.295***	**2.398***	1.023	0.693	-0.067	1.152
	[0.702]	[0.899]	[0.657]	[0.712]	[1.250]	[1.883]
Clearing house Member	1.778**	**1.948**	1.505*	1.019	0.121	0.633
	[0.739]	[0.919]	[0.769]	[0.889]	[1.125]	[1.929]
Distance to Nearest Fed	0.009	0.009	**-0.013***	**-0.013***	0.258*	0.211
City	[0.011]	[0.009]	[0.005]	[0.005]	[0.154]	[0.201]
Ln(Assets in Fed Banks	0.009	-0.133	-0.076	-0.188	6.311	4.611
Within 25 Miles)	[0.471]	[0.477]	[0.145]	[0.175]	[4.078]	[5.208]
Assets/Assets in Fed	4.270	1.980	1.509	-1.040	23.648	17.219
Banks Within 25 Miles	[3.572]	[4.521]	[2.254]	[2.829]	[15.916]	[26.874]
# of Due from Correspondents	-0.075	-0.138	-0.124	-0.223	-0.548	-0.708
	[0.189]	[0.203]	[0.214]	[0.226]	[0.538]	[0.615]
Share of Due From Corresp.	-1.770*	-1.854**	-1.250	-1.565*	-2.637	-4.068
in Manhattan	[0.927]	[0.931]	[0.877]	[0.905]	[1.967]	[2.577]
Any Due to Correspondents	0.999	0.193	-0.700	-1.286	-0.122	1.297
	[0.684]	[1.014]	[0.776]	[0.865]	[0.949]	[2.212]
Ln(Assets in 1914)		0.577		0.603		0.258
		[0.474]		[0.392]		[1.004]
Avg Loans/Assets 1912-1914		6.699**		-1.450		4.622
		[3.331]		[1.775]		[7.458]
Avg Percentage Loan		-3.687		0.863		**23.051**
Swing Q3-Q4 1912-1914		[5.592]		[2.083]		[9.659]
County Values in 1920	Yes	Yes	Yes	Yes	Yes	Yes
County Fixed Effects	No	No	No	No	No	No
Observations	232	232	204	204	170	170

Effects of Joining Fed

$$Y_{i,t} = a + \beta_1 MemberEver_i + \beta_2 Member_{i,t}$$
$$+ \beta_3 Z_{i,t} + \beta_4 X_{i,1920} + \beta_5 BS_{i,1912-14} + t_t$$
$$+ e_{i,t} \quad (2)$$

Effects on behavior should depend on whether joining makes you a liquidity provider or user, so we separate due-to banks.

Table 8: The Effects of Becoming a Fed Member (1915-1924)

	Percentage Loan Swing Q3-Q4		Cash/Assets		(Due from Banks + Due from Fed)/Assets		Loans/Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fed Member Ever	0.017**		0.010*		-0.013**		-0.035***	
	[0.008]		[0.006]		[0.006]		[0.013]	
Fed Member In Year	**-0.015***	**-0.019***	**-0.015****	**-0.015****	**0.018****	**0.020****	**0.046****	**0.042****
	[0.008]	**[0.009]**	**[0.003]**	**[0.003]**	**[0.004]**	**[0.006]**	**[0.007]**	**[0.014]**
Trust Company	0.005	-0.002	-0.022***	0.001	-0.006	0.021***	-0.006	0.030
	[0.006]	[0.011]	[0.005]	[0.006]	[0.005]	[0.005]	[0.011]	[0.036]
Clearing house Member	0.011	0.025**	0.011***	0.004	-0.011**	-0.012*	0.001	-0.001
	[0.007]	[0.010]	[0.003]	[0.004]	[0.005]	[0.006]	[0.010]	[0.015]
Distance to Nearest Fed	-0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000
City	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Assets in Fed Banks	-0.002	0.004	-0.002**	-0.003	-0.005***	-0.027***	-0.005	0.017
Within 25 Miles)	[0.003]	[0.012]	[0.001]	[0.003]	[0.002]	[0.009]	[0.004]	[0.019]
Assets/Assets in Fed	0.002	-0.020	-0.007	-0.033**	-0.039*	-0.103**	-0.064	-0.122
Banks Within 25 Miles	[0.030]	[0.046]	[0.009]	[0.017]	[0.021]	[0.049]	[0.048]	[0.099]
# of Due from Corresp	-0.002*	-0.005*	0.001	0.002	0.002**	0.003*	-0.005**	-0.011***
	[0.001]	[0.003]	[0.001]	[0.002]	[0.001]	[0.002]	[0.002]	[0.004]
Share of Due From Corresp	0.011	0.015	-0.006	0.002	-0.012*	-0.007	0.012	0.023
in Manhattan	[0.010]	[0.022]	[0.004]	[0.006]	[0.007]	[0.013]	[0.014]	[0.024]
Any Due to Correspondents	0.032***	0.000	0.009	0.000	0.026***	0.000	-0.031*	0.000
	[0.009]	[0.000]	[0.011]	[0.000]	[0.009]	[0.000]	[0.019]	[0.000]
Ln(Assets in 1914)	-0.009**		0.001		-0.002		0.014*	
	[0.004]		[0.002]		[0.003]		[0.007]	
Avg Loans/Assets	-0.057**		0.003		-0.032*		**0.713****	
1912-1914	[0.026]		[0.011]		[0.019]		[0.048]	
Avg Percentage Loan	**0.262****		-0.033		0.035		0.020	
Swing Q3-Q4 1912-1914	[0.054]		[0.030]		[0.032]		[0.093]	
Bank Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Values in 1920	Yes	No	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200

Table 9: The Effects of Becoming a Fed Member On Correspondent Banks and Non-Correspondent Banks (1915-1924) - 1

| | Not Listed in Rand McNally As Correspondent of State Bank | | | | | | | |
| | Percentage Loan Swing Q3-Q4 | | Cash/Assets | | (Due from Banks + Due from Fed)/Assets | | Loans/Assets | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fed Member Ever	0.010		0.009		-0.012**		-0.035**	
	[0.008]		[0.006]		[0.006]		[0.014]	
Fed Member In Year	-0.005	-0.008	-0.015***	-0.016***	0.020***	0.020***	0.052***	0.048***
	[0.008]	[0.010]	[0.003]	[0.004]	[0.004]	[0.006]	[0.008]	[0.015]
Bal Sheet Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Values in 1920	Yes	No	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,940	1,940	1,940	1,940	1,940	1,940	1,940	1,940

Table 9: The Effects of Becoming a Fed Member On Correspondent Banks and Non-Correspondent Banks (1915-1924) - 2

| | Listed in Rand McNally As Correspondent of State Bank | | | | | | | |
| | Percentage Loan Swing Q3-Q4 | | Cash/Assets | | (Due from Banks + Due from Fed)/Assets | | Loans/Assets | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fed Member Ever	0.044		0.037		-0.040		-0.035	
	[0.029]		[0.035]		[0.033]		[0.068]	
Fed Member In Year	-0.046**	-0.052***	-0.003	-0.006	0.016	0.018	-0.021	-0.022
	[0.021]	[0.019]	[0.012]	[0.013]	[0.014]	[0.017]	[0.019]	[0.025]
Bal. Sheet Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Values in 1920	Yes	No	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	260	260	260	260	260	260	260	260

Timing

- Effect on loans for non-due-to banks is immediate.

- Effect on swing for due-too banks is delayed (as they built their network)

Table 10: The Effects of Becoming a Fed Member (1915-1924)

	Percentage Loan Swing Q3-Q4		Cash/Assets		(Due from Banks + Due from Fed)/Assets		Loans/Assets	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fed Member Ever	0.018**		0.010		-0.014**		-0.035***	
	[0.008]		[0.006]		[0.006]		[0.013]	
First Year of Fed Membership	0.003	-0.001	-0.013***	-0.013**	-0.002	0.001	0.047***	0.042***
	[0.016]	[0.017]	[0.004]	[0.005]	[0.005]	[0.006]	[0.009]	[0.013]
Second Year of Fed Membership	-0.014	-0.018	-0.019***	-0.019***	0.008	0.011*	0.064***	0.059***
	[0.012]	[0.011]	[0.005]	[0.005]	[0.005]	[0.006]	[0.011]	[0.016]
Third Year of Fed Membership	-0.032***	-0.037***	-0.015***	-0.016***	0.019***	0.021***	0.064***	0.059***
	[0.010]	[0.011]	[0.005]	[0.005]	[0.005]	[0.006]	[0.012]	[0.017]
Fourth Year of Fed Membership	-0.035***	-0.039***	-0.012***	-0.012***	0.024***	0.026***	0.051***	0.048***
	[0.011]	[0.014]	[0.003]	[0.003]	[0.005]	[0.007]	[0.011]	[0.016]
Fifth Year of Fed Membership	-0.025**	-0.030**	-0.015***	-0.016***	0.029***	0.031***	0.030***	0.028*
	[0.013]	[0.014]	[0.004]	[0.004]	[0.005]	[0.007]	[0.012]	[0.016]
Bank and Bal. Sheet Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County Values in 1920	Yes	No	Yes	No	Yes	No	Yes	No
County Fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	2,050	2,050	2,050	2,050	2,050	2,050	2,050	2,050

Conclusions

- Fed succeeded in mitigating liquidity risk and was perceived as being able to do so.
- Membership was a cost-benefit calculation that weighed reduced liquidity risk against other factors (reserve costs, par clearing).
- Banks could get some, but not all, of the advantages of discount window indirectly.
- For some banks, joining Fed helped them become more important as network nodes. Behavior of nodes and other banks differed as the result of Fed (suppliers and users of liquidity affected loan swing).
- Joining Fed for non-due-to banks led to increased lending.