

Like Taxi Drivers Disappearing in the Rain? Historical Evidence on the Usability of Liquidity Buffers

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Purpose

Liquidity regulations were introduced following the 2008 financial crisis

- Ensure banks have sufficient liquid resources to weather liquidity shocks
- Intended to bolster the resilience of the financial system

Liquid resources are intended to be used, but unclear whether banks are willing to do so

- **Useable**: banks will want to help their customers, higher short-term rates should incentivize deployment of liquid resources
- **Not useable**: banks may be concerned about violating rules, prudentially cautious during shocks

Recent evidence on usability of liquidity buffers is mixed

History can provide valuable additional evidence

This Paper: Experience of New York Banks

New York Clearing House member banks subject to liquidity requirements

- From the National Bank Acts, State Regulations, Clearinghouse rules
 - Purpose aligns with modern thinking
 - Rules vague on usability
- Required to disclose information weekly
- Non-member, but associated, banks subject to similar requirement

NYC banks are ideal for several reasons

- Exposed to shocks: seasonal pressures, minor local stress, severe crises
- Key liquidity providers to the financial system

Preliminary results:

- Banks sensibly adjust liquidity buffers
 - Move in line with deposit flows and inversely with interest rates
 - Some resistance to adjustment when near regulatory minimums
- Liquidity buffers used during stress, though reserve changes were somewhat less responsive to deposit outflows during minor stress

Data

Balance sheets reported in the Commercial and Financial Chronicle

- Use the last week of the month
- Ratio is simple (specie + legals)/deposits

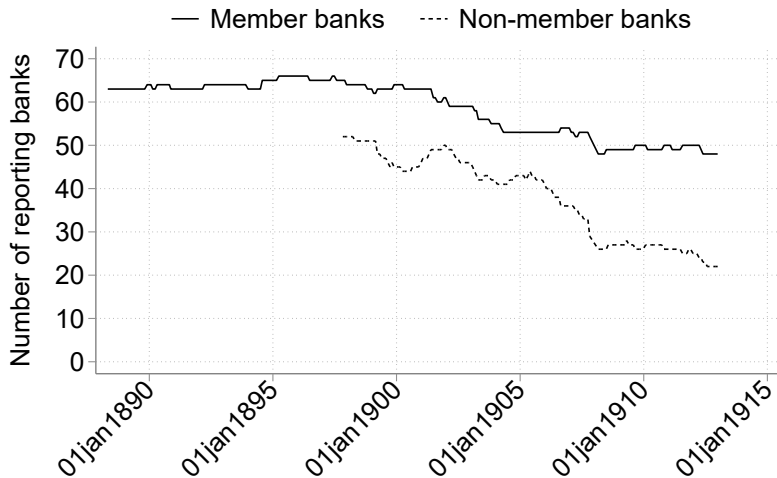
Call loan rates from the Economist (courtesy of Neal and Weidenmier)

Call report data (national and state) to determine which banks were most connected to the interbank system (work in progress)

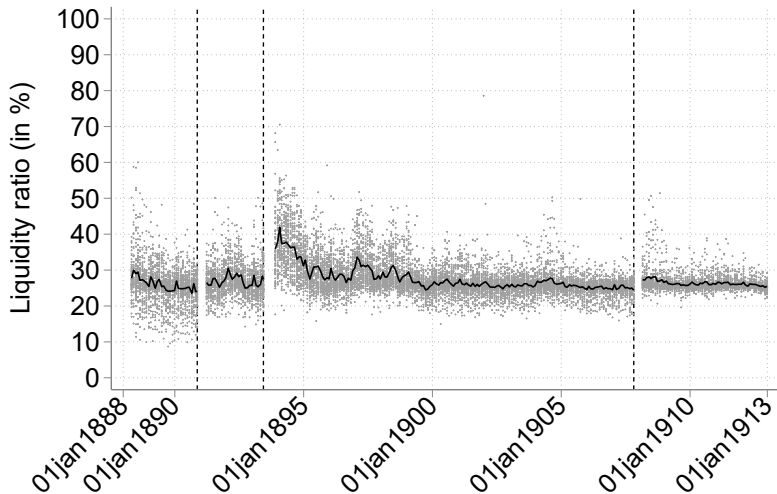
New York City Bank Statement for the week ending Feb. 21, 1890, is as follows. We omit two ciphers (00) in all cases.

BANKS. (00s omitted.)	Capital.		Surplus.		Loans.		Specie.		Legals.		Deposits.	
	\$	¢	\$	¢	\$	¢	\$	¢	\$	¢	\$	¢
Bank of New York...	2,000.0	1,098.7	11,800.0	2,450.0	510.0	11,430.0						
Manhattan Co.	2,050.0	1,300.1	10,500.0	1,380.0	820.0	10,420.0						
Worban's	2,000.0	883.8	7,555.5	1,470.0	737.4	7,717.0						
Wachman's	2,000.0	1,773.0	3,207.0	1,871.0	464.0	8,732.0						
American	3,000.0	1,762.0	11,110.1	2,234.3	349.3	11,397.9						
Phoenix	1,000.0	551.9	4,578.3	768.0	109.0	4,174.0						
City	1,000.0	2,342.8	10,561.7	3,080.0	615.0	11,274.8						
Tradesmen's	1,000.0	219.0	3,040.8	273.5	148.4	1,854.3						
Chemical	3,000.0	6,042.3	21,970.7	7,800.0	1,378.6	20,431.6						
Merchants' Exchange	6,000.0	130.3	3,777.4	470.4	359.2	4,174.0						
Sailors National	1,000.0	1,272.5	3,412.3	378.8	340.8	4,125.5						
Bathers & Drivers'	300.0	287.7	1,070.0	569.8	76.2	1,067.3						
Mechanics & Traders	200.0	214.4	2,738.0	119.0	65.0	3,103.0						
Leather	200.0	116.7	1,256.0	138.5	184.7	1,917.7						
Leather Manufact'rs.	600.0	561.6	2,854.1	561.4	100.3	2,571.7						
Seventh National	300.0	80.7	1,256.7	294.0	37.3	1,221.0						
State of New York	1,200.0	47.5	3,540.8	212.0	821.0	2,733.5						
American Exchange	5,000.0	1,031.5	18,064.0	3,310.0	900.1	19,474.7						
Commerce	5,000.0	3,281.9	18,290.3	1,195.3	1,671.4	11,952.8						
Broadway	1,000.0	1,615.9	5,504.4	355.5	298.8	4,463.3						
Merchants'	1,000.0	861.8	8,405.0	1,400.0	864.5	9,099.4						
Republic	427.1	375.2	2,788.0	411.5	223.2	3,067.4						
Republic	1,500.0	889.2	12,177.9	3,387.5	410.8	13,877.8						
Chatham	450.0	624.0	5,001.9	777.0	688.6	6,275.2						
Peoples'	200.0	260.8	2,357.2	225.5	144.9	2,014.8						
North America	700.0	493.4	4,863.8	530.7	381.6	4,715.2						
Hanover	1,000.0	1,293.8	14,280.5	5,017.9	570.1	16,648.5						
Irving	500.0	280.3	3,050.0	600.0	160.6	3,120.0						
Uticens'	600.0	492.3	2,897.2	442.4	130.8	2,764.8						
Wasson	500.0	183.8	2,684.6	336.0	260.4	3,271.3						
Market & Fulton	750.0	697.5	4,101.8	1,022.0	80.8	4,461.6						
St. Nicholas	500.0	200.0	1,331.3	163.8	136.7	1,770.0						
Shoe & Leather	500.0	246.3	3,102.0	65.0	370.0	3,881.0						
Cure Exchange	1,000.0	1,112.9	6,507.4	310.6	246.0	5,691.3						
Continental	1,000.0	477.0	4,650.0	692.0	318.0	4,861.0						
Oriental	800.0	364.9	2,197.2	130.0	344.9	2,110.2						
Importers' & Traders	1,500.0	4,528.7	22,717.5	3,783.8	1,736.0	22,870.0						
Park	2,000.0	2,107.0	11,450.8	4,663.2	882.8	24,837.2						
North River	1,000.0	942.3	4,869.0	140.0	114.0	5,823.3						
East River	250.0	132.8	1,065.0	222.1	117.3	1,160.0						
Fourth National	3,200.0	1,543.1	17,480.2	3,495.3	1,013.4	17,324.2						
Central National	2,000.0	563.7	7,022.0	1,088.0	775.0	8,671.0						
Second National	3,000.0	73.5	4,218.0	1,240.0	117.0	5,471.0						
Ninth National	750.0	318.4	5,618.9	1,469.5	331.6	6,309.2						
Firs. National	5.00	6,107.8	22,971.6	4,847.2	984.3	22,751.7						
Third National	1,000.0	307.4	7,219.2	1,430.8	500.8	8,339.2						
U. S. Nat'l Exchange	2,000.0	1,128.4	14,407.7	3,350.0	184.9	18,442.6						
Bowery	250.0	437.2	2,528.0	539.0	220.0	2,823.0						
New York County	2,000.0	889.0	2,525.5	709.0	197.0	2,973.5						
German-American	750.0	231.8	2,655.4	475.1	134.8	2,724.4						
Chase National	300.0	752.0	6,789.0	2,073.4	1,075.2	11,635.3						
Fifth Avenue	100.0	747.9	4,439.4	903.4	210.0	4,760.3						
German Exchange	200.0	458.7	2,962.8	183.1	818.9	3,311.1						
Germania	200.0	394.5	2,452.0	154.1	314.0	2,831.2						
United States	500.0	438.9	4,830.0	1,288.0	80.8	5,447.4						
Lincoln	300.0	258.9	3,051.5	88.0	210.3	3,457.2						
Jarvis	200.0	290.7	2,070.5	670.2	341.0	3,082.7						
Fifth National	150.0	275.0	1,649.2	389.1	246.5	1,972.3						
Bank of the Metrop.	300.0	312.3	4,322.7	1,073.2	26.3	5,176.0						
West Side	200.0	184.0	2,184.0	870.0	184.0	3,238.0						
Seaboard	500.0	145.8	1,055.0	644.0	685.0	4,742.0						
Western National	3,500.0	258.0	10,265.0	1,767.7	295.4	8,295.1						
Fit. National, B'klyn	300.0	718.0	3,974.0	1,082.0	118.0	4,124.0						
Total ...	60,862.7	57,620.9	414,574.0	84,911.4	27,723.7	427,737.2						

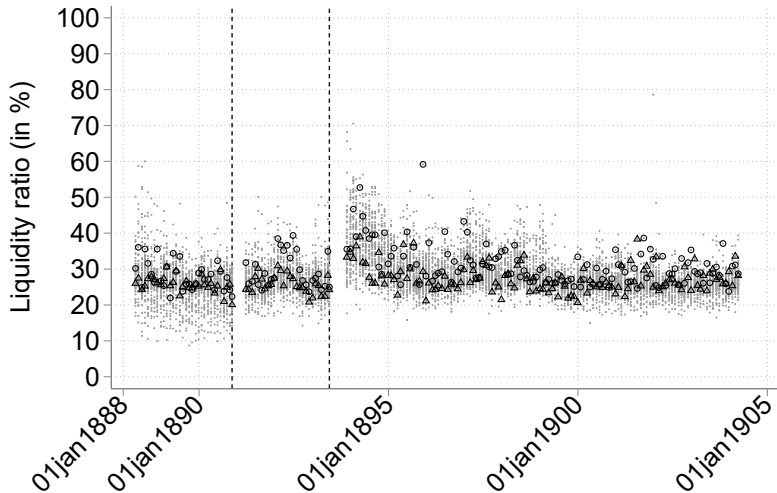
Sample composition over time



Liquidity ratios at NYCH banks



Liquidity ratios at NYCH banks



Behavior during “normal times”

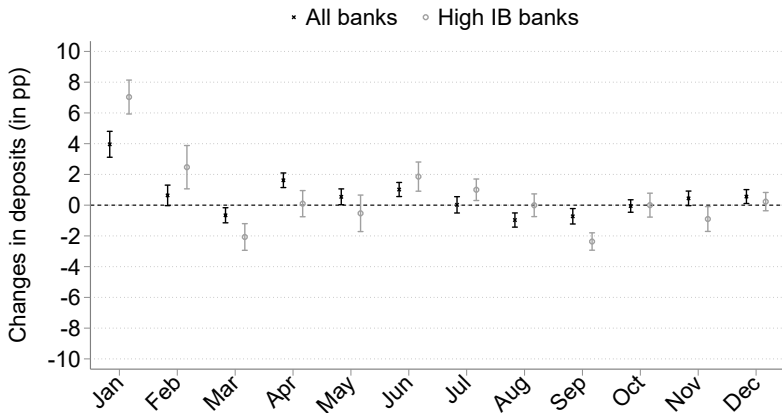
Liquidity ratios should depend on basics

Seasonal factors, which we take as exogenous

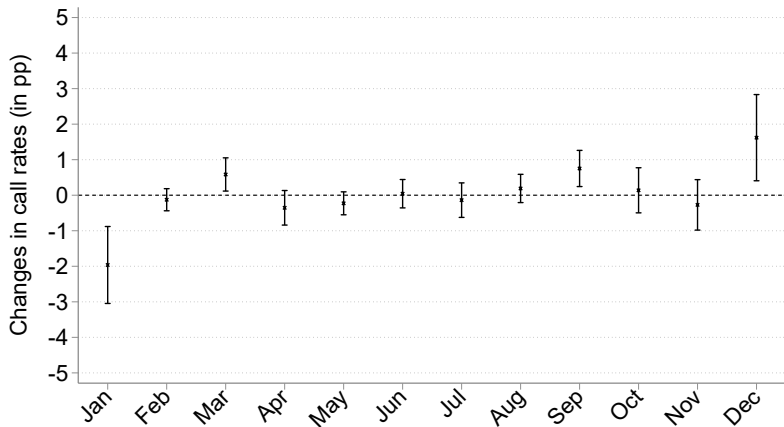
- Inflow/outflow of funds into New York
- Changes in short-term interest rates

Minimum liquidity requirements (also exogenous)

Factors moving ratios in normal times - deposit flows



Factors moving ratios in normal times - interest rates



Liquidity ratios, deposit flows, and interest rates

	Outcome: change in liquidity ratio (in percentage points)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Deposit change (in pp)	0.0827*** (0.0181)	0.1502*** (0.0174)	-0.0489*** (0.0099)	0.0743*** (0.0253)	0.1797*** (0.0209)	-0.0664*** (0.0104)	-0.0462*** (0.0105)
Call rate change (in pp)	-0.1104*** (0.0174)	-0.1034*** (0.0194)	0.0187 (0.0152)	-0.1125*** (0.0266)	-0.0994*** (0.0237)	0.0793* (0.0429)	0.0002 (0.0196)
Observations	21,712	15,691	6,021	3,811	11,880	1,430	4,591
Adjusted R ²	0.06	0.11	0.07	0.08	0.13	0.07	0.08
Banks	All	Members	Non-memb.	Members	Members	Non-memb.	Non-memb.
Sample	All	All	All	High IB	Low IB	High IB	Low IB
Fixed effects	Month	Month	Month	Month	Month	Month	Month

Results robust to using **shift-share instrument** for deposits

(pre-determined bank-level exposure to interbank deposits \times seasonal shift)

Did regulatory minima matter?

	Outcome: change in liquidity ratio (in pp.)		
	(1)	(2)	(3)
Deposit change (in pp)	0.1681*** (0.0176)	0.0835*** (0.0248)	0.2064*** (0.0200)
Call rate change (in pp)	-0.1011*** (0.0206)	-0.1125*** (0.0298)	-0.0979*** (0.0258)
Below 25 % (lagged)	2.0175*** (0.1251)	2.3483*** (0.2095)	1.9742*** (0.1343)
Interaction (dep. chg. × below 25 %)	-0.0819*** (0.0228)	-0.0396** (0.0167)	-0.1095*** (0.0311)
Interaction (rate chg. × below 25 %)	0.0174 (0.0310)	0.0437 (0.0559)	0.0134 (0.0368)
Observations	15,688	3,811	11,877
Adjusted R ²	0.17	0.14	0.19
Banks	Members	Members	Members
Sample	All	High IB	Low IB
Fixed effects	Month	Month	Month

Behavior during “crisis times”

Determining periods of stress

Major crises

- Suspensions of data publication and issuance of clearinghouse certificates are considered “severe stress” periods
 - Use the week just prior to suspension as relevant observation
 - Occur in 1890, 1893, and 1907
- The month just after reopening is also not considered normal (but not stress) – flagged as “stress aftermath”

Minor stresses

- Follow Kemmerer (1910) and Jalil (2015) for “minor stresses”
 - Dec 1899, May-June 1901, May-August 1903
 - Use the months during those periods as minor stresses

Behavior during stress - Basic facts

Just prior to NYCH suspension (i.e. major crises):

- **Reserve ratios** for member banks averaged **just under 20 percent**, lower quartile was 17 percent
- **2 percent** of banks were **below their normal times minima**

During minor stresses, **only 1 percent** of banks were below their normal times minima

Were ratios lower during stress periods?

	Outcome: liquidity ratio (in percent)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All stress events	-1.9275*** (0.2069)				-0.5654 (0.3367)			
Mild stress		-1.9416*** (0.2639)				-0.4365 (0.3722)		
Severe stress			-1.7842*** (0.3205)				-1.8317*** (0.4032)	
Stress aftermath				3.1731*** (0.4236)				-0.5070 (0.4774)
Observations	16,797	16,797	16,797	16,797	6,846	6,846	6,846	6,846
Adjusted R ²	0.17	0.17	0.16	0.17	0.57	0.57	0.57	0.57
Banks	Members	Members	Members	Members	Non-memb.	Non-memb.	Non-memb.	Non-memb.
Bank and month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Some evidence for attenuation effects during stress periods

	Outcome: changes in reserves (in percentage points)					
	(1)	(2)	(3)	(4)	(5)	(6)
Deposit change (in pp)	0.4123*** (0.0174)	0.3603*** (0.0182)	0.4322*** (0.0229)	0.0698*** (0.0104)	0.0544*** (0.0119)	0.0724*** (0.0109)
Call rate change (in pp)	-0.0819*** (0.0147)	-0.0971*** (0.0145)	-0.0779*** (0.0187)	-0.0308* (0.0166)	-0.0437* (0.0247)	-0.0287 (0.0184)
Severe stress	0.4768** (0.2050)	0.6661** (0.2931)	0.4237 (0.2568)	0.4856 (0.4613)	-1.0136 (1.5085)	0.7994** (0.3385)
Mild stress	0.1276 (0.1160)	0.4472** (0.1971)	0.0420 (0.1253)	0.0384 (0.0432)	0.0976 (0.1009)	0.0197 (0.0488)
Deposit change × severe stress	0.0318 (0.0534)	0.0771 (0.0772)	0.0149 (0.0695)	0.0568 (0.0424)	0.0601 (0.0371)	-0.0278 (0.0433)
Deposit change × mild stress	-0.0850* (0.0427)	0.0156 (0.0435)	-0.1251** (0.0582)	-0.0055 (0.0130)	0.0097 (0.0198)	-0.0078 (0.0141)
Observations	16,458	3,999	12,459	6,382	1,516	4,866
Adjusted R ²	0.48	0.47	0.48	0.19	0.10	0.22
Banks	Members	Members	Members	Non-memb.	Non-memb.	Non-memb.
Sample	All	High IB	Low IB	All	High IB	Low IB
Bank and month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Conclusion

In National Banking Era, NYC banks **did use their liquidity buffers...sorta**

In normal times, bank reserves and reserve ratios fell when:

- Interest rates rose
 - Deposits declined
- (but less so when banks were near the regulatory minima)

In stress, banks allowed buffers to fall and generally behaved as during normal times

- Used their liquid resources
- But were maybe less responsive during minor stresses

Appendix

National Bank reserve requirement

BANK RESERVES

FORMS FOR CALCULATING RESERVE

BP Bank Officers should bear in mind that Section 3001, U. S. Revised Statutes, forbids a Bank to increase the liabilities by any loans or discounts, or to reduce any reserve when its reserves to meet the legal requirements.

FORM A.—CALCULATION OF THE LAWFUL MONEY RESERVE OF NATIONAL BANKS LOCATED IN RESERVE CITIES AND CENTRAL RESERVE CITIES.

No. of Bank _____ Report of the state of lawful money reserve of the _____
 Located at _____ State of _____ at _____ o'clock _____ p. m.

H. B.—If this recapitulative Report of Condition it should be signed by _____ Cashier
 If it recapitulative Report of Examination it should be signed by _____ Examiner

ITEMS ON WHICH RESERVE IS TO BE COMPUTED.

ASSETS.

Due to National Banks.....									
Due to State Banks and Bankers.....									
Due to Trust Companies, etc.....									
Due from other National Banks.....									
Due from State Banks and Bankers.....									
Dividends unpaid.....									
Individual Deposits.....									
United States Deposits.....									
Deposits of U. S. Debiting Officers.....									
Grand amount.....									
DEDUCTIONS ALLOWED.									
Checks on other Banks in the same place.....									
Exchange for Clearing House.....									
National Bank Notes.....									
Twenty-five per cent of this total amount* is the entire Reserve required, which is.....									
Deduct 3 per cent Redemption Fund with Treasury U. S. Net Reserve to be held.....									

ITEMS COMPOSING THE NET RESERVE AND THE DISTRIBUTION OF THE SAME.

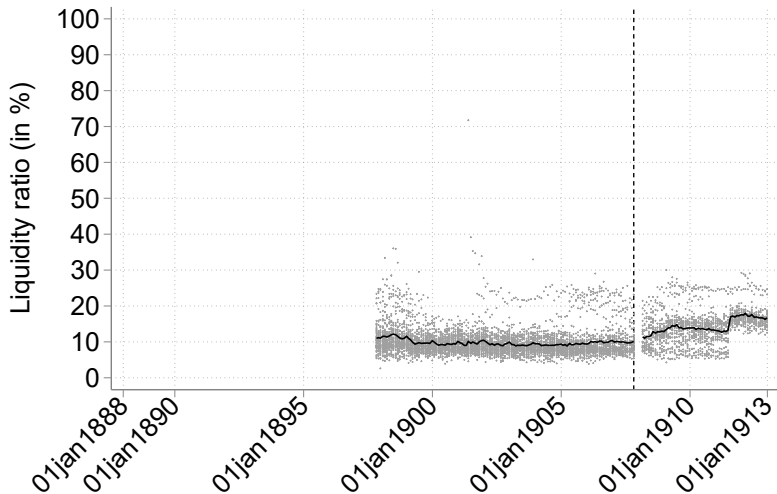
One-half of the Net Reserve is.....									
Reserve standing up for notes and deposits of* Balance with following approved Reserve Agents: viz:									
Excess with Reserve Agents.....									
Deficiency with Reserve Agents.....									
One-half of the Net Reserve is.....									
Items in Bank's possession to make up the same, viz:									
Fractional Silver.....									
Silver Dollars.....									
Silver Treasury Cert's.....									
Gold Coins.....									
Gold Treasury Cert's.....									
Legal Tender Notes.....									
U. S. Cert's of Deposit for Legal Tender.....									
U. S. Cert's of 10 or 50 Dollars.....									
Excess in items held by the Bank.....									
Deficiency in items held by the Bank.....									

RECAPITULATION.

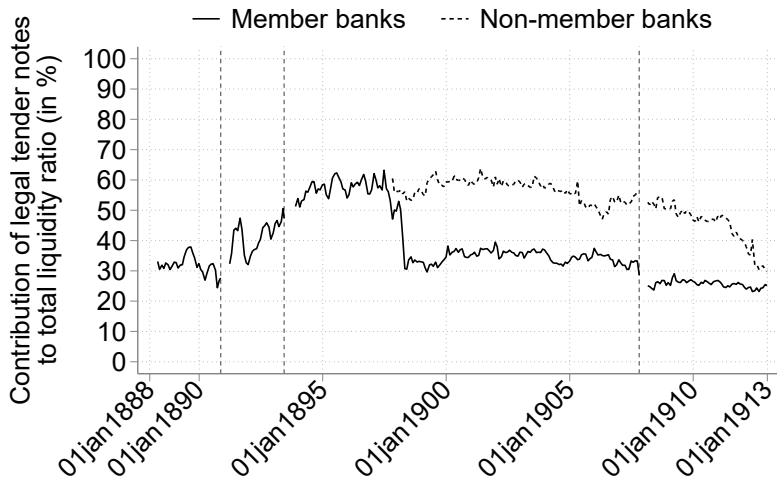
Excess in the entire Reserve held, \$ _____ Deficiency in the entire Reserve held, \$ _____

* If approved payments are made with reserve agents, only the net amount due from such agents is available for reserve.
 * U. S. — Banks in New York City and in cities having Central Reserve Banks under the act of March 3, 1857, must keep the whole net Reserve required, when determined as above, in their own possession.
 Bank officers will always have in their Reports of Condition one of their Reserve Agents first in, and Bank Statements will be the same in such Reports of Condition.

Liquidity ratios at non-member banks



Decomposition of aggregate liquidity ratios



Interbank exposure of NYCH member and non-member banks

