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Monetary Policy and the Behavior of Banks: Lessons from the 1930s for the 2010s*

Charles Calomiris
Columbia University Graduate School of Business

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Introduction

As bank lending begins to recover, and as the U.S. economy gains momentum, attention is shifting toward the inflationary bias of monetary policy. Commodity prices have been booming, and inflation expectations have crept higher. The Fed continues to reassure its critics that it will be able to identify changes in the economy quickly enough to prevent an inflationary surge. But critics are sceptical for good reason. There are legitimate concerns about the ability of the Fed to react quickly enough to tighten policy, given the challenges of selling many of its assets (Calomiris and Tallman 2010). Additionally, there is cause for concern that the Fed may be slow to detect a sudden shift in the money multiplier. That concern – which is informed by an understanding of the micro-foundations of the money multiplier, as illustrated by the history of the 1930s – is the subject of this article.

The Failure to understand the microeconomics of the connections between banks' conditions and their demand for liquid assets underlay policy errors by the Fed in the 1930s, and mistakes of interpretation by economic historians about the sources of the money and credit collapse of 1930-1933. Similar failures of understanding today could result in major errors in the other direction, toward accelerating inflation. In particular, banks are likely to reduce their liquidity demand dramatically once crisis fears have passed, and there are reasons to worry that central banks may be slow to respond to that reduced demand for reserves and increased supply of lending.

Variation in the money multiplier, especially related to banking system distress in 1930-1933 that increased banks' ratios of reserves to deposits and the public's demand for cash, drove the supply of money and credit during the 1930s, with important consequences for the economy. In their classic 1963 treatise, *A Monetary History of the U.S.*, Friedman and Schwartz saw the history of the 1930s in the U.S. largely as a series of failures by the central bank that resulted in the a collapse of money and credit in 1930-1933, which resulted in the Great Depression. A contraction of money and credit occurred again in 1937 which helped to precipitate the recession of 1937-1938.

Monetary policy during the 1930s, according to Friedman and Schwartz and others (see Calomiris 2011 for a review), both failed to offset adverse shocks to money and credit, and sometimes caused those shocks. The Fed wrongly believed that high reserves meant that credit conditions were loose when in fact it reflected banks' desires to shore up their positions to meet and forestall deposit withdrawals. This led the Fed, catastrophically, to fail to loosen.

Friedman and Schwartz were right to point to monetary and bank credit contraction as central to the economic devastation of the 1930s. Calomiris and Mason (2003a) show that exogenous declines in loan supply caused by deposit contraction had huge effects on local economic growth. They estimate a local (state-level) output elasticity with respect to loan-supply contractions of roughly 0.5. But with respect to the behaviour of banks driving that loan-supply contraction, Friedman and Schwartz did not get the story quite right in three important respects. Specifically, (1) deposit withdrawal risk reflected a largely rational and predictable process of deposit market discipline rather than panics, at least prior to 1933, (2) depositors and banks did not become more risk-averse after the Depression – depositor risk tolerance was fairly constant over the period 1920-1940; (3) voluntary reserve demand, not reserve requirements, were the binding constraint on banks' reserve holdings, even after the increases in reserve requirements in 1936 and 1937. These modifications of the traditional Friedman-Schwartz story have important implications for understanding the relationship between the

microeconomics of bank risk management, on the one hand, and the variation in the supply of money and credit, and its macroeconomic implications, on the other hand.

Did "Panics" Drive the Credit Crunch of 30-33?

Friedman and Schwartz saw rising reserve-to-deposit ratio as a response to unwarranted panics in 1930, 1931, and early 1933. Recent work, however, shows reserve demand responded to changes in bank losses and risk. The process was continuous, and varied across locations and banks. Bank distress in 1930-1931 in part reflected continuing agricultural problems from 1920s. As general money and credit contraction tool hold, other loan losses and risks threatened some banks more than others. Disintermediation prior to 1933 was mainly a process of selective deposit market discipline. Rising risks caused risky banks to contract lending and deposits.

Clearly, bank failures were a major part of the Depression, and there is no question that the default risk and liquidity risk of banks rose dramatically, and that those risks drove bank reserve demand. In the U.S., over the period 1873-1913 (despite six major bank panics), the negative net worth of failed banks in any year never exceeded 0.1% of GDP. During the 1920s, failure risk was exceptionally high; 5,712 banks failed from 1921 to 1929 (mainly small, agricultural banks, constituting 3.1% of total bank deposits), which had total negative net worth of 0.6% of GDP. Failure risk accelerated after 1929. During 1930-1933, 9,096 banks failed (mainly small, agricultural banks, constituting 14% of total bank deposits), which had total negative net worth of 2.0% of GDP.

Recent research by Calomiris and Mason (1997, 2003b) shows that bank failures prior to 1933 were generally not part of a national wave of panic; rather, there were clear links between deteriorating local economic conditions and endogenous bank risk, which was reflected in local bank failures. Those local patterns in bank failure also drove important differences in loan supply and reserve demand, with important macroeconomic consequences that varied dramatically across locations.

Over-Reactions to Panics and Increasing Bank Risk Aversion?

Friedman and Schwartz also believed that the amount of reserve accumulation by banks in the 1930s reflected an increase in risk aversion after the bank failures of the period 1930-1933. Recent research by Calomiris and Wilson (2004) and Calomiris and Mason (1997, 2003b), however, shows that the long-term targeted risk of default on deposits enforced by deposit market discipline was remarkably constant from 1920 to 1940. Reserve holdings rose dramatically because risk was rising, and because reserves had to substitute for dramatic declines in bank equity capital (due to loan losses). That discipline was reflected in observable cross-sectional differences in banks' abilities to access the deposit market.

Old-fashioned disciplined banking exhibited the following pattern of predictable bank behavior. First, depositors (displaying behavior that is typical of all money market instrument holders) were risk intolerant, and required very low default risk, or else they demanded the return of their funds. Money market instrument holders, in other words, do not just price risk, they run from it. Second, banks have two key tools that they use to manage risk: the ratio of equity to assets, and asset risk (managed, for example, by varying their loan-to-cash assets ratio, or by varying the riskiness of loans). Over the long run, banks choose an optimal mix of equity and asset risk. This mix varies by bank and over time.

Cross-sectional variation in the mix chosen depends on the relative profitability of lending and the relative opacity of banks' risks. Banks with high loan opportunities or less-opaque risks will tend to manage default risk with a combination of a relatively high equity ratio and a relatively high level of asset risk. Across time, banks are better able to raise equity during good times, when adverse selection problems are low and lending opportunities are high, making equity capital more needed and relatively cheap.

In the short-term, banks mainly manage default risk by using the loan-to-cash assets (reserves) ratio as their main instrument for targeting a sufficiently low default risk on their debts. When a shock hits – for example, the onset of a recession – banks face the prospect of the loss of deposits as loan risk and loan losses rise (and equity falls), especially given asymmetric information problems about their loan portfolios that create concerns in the minds of depositors about hidden loan losses. As banks with excessively high default risk lose deposits they act to restore confidence by contracting loans, cutting dividends, and expanding cash asset holdings, as shown in Table 1, which documents that behavior for New York City banks during the 1920s and 1930s.

Deposit market discipline is visible in three aspects of financing of banks, illustrated by Table 2's comparison of high-risk and low-risk banks in Chicago in 1932. First, the interest cost of debt goes up with risk. Second, at sufficiently high risk, depositors withdraw funds rather than re-price risk, so risky banks experience declines in deposits relative to other banks. Third, risky banks that lose some of their risk-intolerant deposits shift their funding mix toward higher-cost, "monitored" sources of funds on the margin. These three effects are consistently visible historically, as well as currently, in disciplined banking systems (see, for example, the Argentine experience of the 1990s, documented by Calomiris and Powell 2001).

As the data in Table 1 for New York City banks in the 1920s and 1930s shows, contrary to Friedman and Schwartz's view, market discipline targeted a consistently low implied default risk on deposits throughout the period, but banks achieved that risk in the 1930s through a combination of low equity capital and low asset risk, given the high loan losses, low loan opportunities, and high adverse-selection problems of the 1930s compared to the 1920s.

Did Doubling of Reserve Requirements Cause the Recession of 1937-1938?

High reserve demand in the mid-1930s reflected continuing macroeconomic risks, especially from tax policy (which saw big increases in 1936), monetary policy (which saw a major change in the direction of the sterilization of gold inflows beginning in December 1936), and regulatory policy (which also saw major changes in 1935-1936).

Friedman and Schwartz argued that the increase of reserve ratios in 1936-1937 resulted from doubling by the Fed in reserve requirements, and this caused a recession in 1937-1938. That view appears to be wrong; the increases in reserves held by banks were the result of voluntary bank choices, not regulatory changes. Banks with different characteristics, including their locations, varied in their reserve demand behaviour, and that variation was predictably related to those characteristics.

Calomiris, Mason and Wheelock (2011) estimate fundamental reserve demand using microeconomic bank-level data for 1934 and 1935 (under the identifying assumption that regulatory reserve requirements did not bind at those dates), and they investigate whether simulated reserve demand, based on that model, explains reserve demand well in 1936-1937, or whether there is a "residual" of higher reserve demand in 1936-1937 that needs to be

explained (by a reserve requirement change or something else). They find that reserve demand followed the predictions of the simulated demand for reserves, based on the risk and liquidity characteristics of non-reserve assets, the liquidity risk of bank deposits, and other characteristics related to the business and location of the bank.

In the simulations, three sets of patterns were observed for different sets of banks over the key period June 1936 to June 1937. In 5 of 15 regions, comprising 17.1% of Fed member banks' assets, reserve ratios for reserve-city banks actually fell. In 4 of 15 regions cases, comprising 36.4% of assets, the changes in reserve ratios for reserve-city banks were zero. In 6 of 15 cases, comprising 46.5% of assets and consisting of four regions of reserve-city banks and the two sets of central reserve city banks (in New York and Chicago), reserve ratios increased, but projected increases were always greater than actual. In none of the 15 cases does one observe a rise in reserve ratios coinciding with a negative residual (a case when projected increases under-forecast actual).

Why Do These Three Interpretive Differences Matter?

If banks' reserves ratios varied over time because of irrational panic in 1930-1933, unpredictable increases in risk aversion after 1933, or policy mandates in 1936-1937, then the causes of the variation in the 1930s teaches little about bank behaviour that is useful for predicting change in the future (e.g., today). If, however, reserve ratios varied predictably, based on stable behavioural responses to observables, then there may be a lot that can be learned that could be useful for predicting bank behaviour today. Thus, showing that predictable reserve demand drove banks' reserve holdings in the 1930s has important potential implications for policy.

The 2007-2009 Banking Crisis

Insured deposits did not experience rollover problems in the recent crisis. Unlike the depositors of the 1930s (who, for the most part, were not covered by federal deposit insurance), almost all U.S. bank depositors today face almost no risk of loss. But many money market liabilities of banks were not insured, including asset-backed commercial paper (ABCP), overnight repurchase agreement funding (repos), and interbank deposits (Libor, Euribor). As in Depression, the market's risk intolerance for money market instruments were apparent in ABCP, Libor, Euribor, and repo markets [Calomiris 2009, Gorton and Metrick 2011]).

Higher default risk and "funding illiquidity" problems at banks in the wake of increased losses and increased risks motivated huge increases in reserve holdings, which prompted a contraction of bank loan supply and sell-offs of risky assets by banks and others.

Runs on ABCP in 2007

Substantial runoff of ABCP occurred at the onset of the crisis in August 2007; but as in the deposit market discipline of the past, it was selective, in ways that showed the importance of risk and asymmetric information for prompting the refusal to rollover some ABCP. Covitz, Liang and Suarez (2009) show only about 40% of ABCP issues experienced a run in 2007, implying substantial cross-sectional variation in the perceived risks of different ABCP issuers during the crisis. The same ABCP issuer characteristics predicted variation in the probability of a run on a particular ABCP issue, variation in the widening of the interest spread, and differences in the shrinkage of ABCP maturities. Those characteristics include: extendability of maturity, a lower credit rating, non-multi seller origination, an SIV issuer, and a non-US bank sponsor.

Credit Rationing in the Unsecured Interbank Market
Initially during the crisis prices cleared the Libor market, but after September 2008, a collapse of the market is visible in the massive accumulation of excess reserves at central banks (Heider, Hoerova and Holthausen 2009). This was the result of an adverse-selection problem: the failure to identify banks that may have been insolvent led prospective counterparties to withdraw from lending to other banks in general. As noted by the *Financial Times* on November 9, 2008: "Neither the recent massive money injections, the coordinated lowering of interest rates nor the use of public funds to recapitalize banks have done much to restart interbank lending. This action did not solve the underlying problem preventing interbank lending: extreme information asymmetry."

The Role of Liquidity Risk
Asset fundamentals were important in sparking the crisis, but during the crisis, the distress sales of assets largely reflected panic selling of risky assets and a scramble for liquidity, especially by banks that faced high liquidity risk from the combination of a high potential exposure to fundamental shocks, the imperfect information about the incidence of those shocks, and the issuance of short-term money market debts.

Schwarz (2009) studies the spread between unsecured Libor and secured OIS transactions. She identifies a liquidity risk factor from two German government bonds with different liquidity characteristics, and separates that liquidity risk factor from a credit risk factor derived from the "tiering" of default risk in Libor spreads. Schwarz shows about two thirds of spread widening in the Libor market is related to the liquidity factor.

How Liquidity Hoarding Ends: The 1930s and the 2010s
In the Great Depression, banks continued to shore up liquidity positions and build capital throughout the mid-1930s, and they survived the recession of 1937-1938 with little adverse consequences (during that recession default risk rose much less than during the early 1930s, and banks did not fail). Banks faced a declining risk environment after 1938 (during the recovery from the recession, which was also a time that saw changes in government policies away from high taxes and high regulatory burdens to more business friendly policies by President Roosevelt, and a surge in aggregate demand related to the rearmament of Europe). Perhaps just as important, the recession of 1937-1938 was the first test of the banking system following the Depression of 1929-1933, and the banking system passed with flying colors; virtually no banks failed. The demonstrated stability of the banking system, along with the improved macroeconomic environment, propelled a sudden surge in confidence, which was reflected in the rapid growth of bank deposits and loans beginning in 1939.

One might even say that bank lending snapped back like a rubber band! For six years (December 1933-December 1939) there was near-zero loan growth ($12.8 billion in December 1933 and $13.9 billion in December 1939). Then, from December 1939 to December 1941, loans grew 29%, and deposits grew 25%, while cash reserves were almost unchanged.

Today, as in mid-1930s uncertainty persists, especially with respect to the sovereign risks and banking system exposures to those risks in the euro zone, and the possibility of FX-risk-related or sovereign-risk-related bank runs, which could plunge global banks back into a heightened-risk environment.

Currently, U.S. Banks hold roughly $1 trillion in excess reserves, partly in recognition of these continuing risks to global growth and financial sector risks. But once the euro-related risks are resolved (perhaps by 2012), and the recovery gains pace, we are likely to see a repeat of the rapid loan growth of 1939-1941.

Potential Problems

Will central banks be able to soak up excess liquidity before those reserves are deployed as new loans to fuel inflation or new asset bubbles? In a rising interest rate environment, where much of the balance sheet of the Fed will consist of long-term Treasury securities with unrealized capital losses, the Fed may wish to avoid recognition of the capital losses on long-term debts that were acquired during its quantitative easing (QE) programs, and therefore, may avoid selling securities via open market operations (Calomiris and Tallman 2010). Thus, in an environment of rising aggregate demand, rising interest rates, and rising loan supply, the Fed may not employ contractionary open market operations to offset the expansion of the money multiplier.

Increases in reserve requirements could provide an alternative policy tool, which could soak up excess reserves to prevent an inflationary lending boom. But such an increase in reserve requirements would disadvantage domestic U.S. banks vis a vis their competitors, and U.S. banks can be relied upon to lobby strongly against such measures.

Fed officials have sometimes referred to another option, which would make use of reverse repos to avoid sales of securities. Repeated reverse repos with money market mutual funds (MMMFs) to reduce high-powered money, however, may not be feasible. Many market participants doubt the willingness of MMMFs to engage in such a large quantity of such transactions.

Even more worrying, the Fed seems to have little interest in gauging the medium-term risks of inflation associated with a substantial expansion of loan supply. To my knowledge, there is very little microeconomic research being pursued at the Fed on the determinants of the demand for reserves.

I conclude that the Fed is likely to be caught behind the curve. During the Depression, Fed officials misunderstood high bank reserves as indicative of easy credit, and consequently failed to loosen policy in 1931-1933. Today, as then, if central banks don’t understand what drives banks’ demand for liquidity, they are likely to make major monetary policy errors, this time in the direction of permitting an unwelcome acceleration of inflation.

Table 1: NYC Banks' Loans/Cash, Risk, Equity, Dividends

	Loans/(R+T)	Ass.Risk	Equity/Ass.	p	Dividends
1923	2.2	1.9	0.20	0.0	
1929	3.3	17.5	0.33	33.5	$392m
1933	1.0	6.1	0.15	41.7	
1936	0.6	4.3	0.17	1.3	
1940	0.3	2.0	0.10	2.1	$162m

Source: Calomiris and Wilson, *Journal of Business,* 2004.

Definitions: Ass.Risk is defined as the implied standard deviation of returns to assets held by banks. Equity/Ass. is the ratio of the market value of equity to the market value of assets. p is the actuarily fair default risk premium on deposits.

Table 2: Chicago 1932

	1932 Failures	1932 Survivors
Number	46	62
1931 R_D	2%	1%
1931 Borr/Debts	12%	2%
1931 Dep growth	-45%	-33%

Source: Calomiris and Mason, *American Economic Review*, 1997.

Definitions: R_D is the average interest rate paid on deposits in 1931. Borr/Debts is the ratio of borrowed funds relative to all bank debt. Borrowed funds are a category of wholesale funding from sophisticated investors. Dep growth is the rate of growth of deposits during 1931.

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