

**Pennacchi**

# **Narrow Banking**

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## **Abstract**

This review discusses the history of narrow banks, reform proposals involving narrow banks, and theory and empirical evidence regarding whether narrow banks should play a more prominent role in the financial system. Prior to the early-twentieth century, US banks tended to be much narrower than they are today. Common modern banking practices, such as maturity transformation and explicit loan commitments, arose only after the creation of the Federal Reserve and the FDIC. My review of theory and empirical evidence finds it largely supportive of narrow bank reforms. Most importantly, a narrow-banking system could have huge advantages by containing moral hazard and reducing the overall risk and required regulation of the financial system.

## **Keywords**

bank regulation, narrow banks, money market funds, finance companies, deposit insurance

**JEL codes: G21, G28.**

## **1. INTRODUCTION**

Narrow banks have existed for hundreds of years and continue to operate today. Many prominent economists and policy makers believe that narrow banks should play a greater role in a reformed financial system. This review discusses the history of narrow banks, reform proposals involving narrow banks, and theory and empirical evidence regarding whether narrow banks should play a more prominent role in the financial system.

A narrow bank is a financial institution that issues demandable liabilities and invests in assets that have little or no nominal interest rate and credit risk. The following financial intermediaries are examples of narrow banks:

1. 100% Reserve Bank (RB): Assets are high-powered money in the form of currency or central bank reserves. Liabilities are noninterest-bearing, demandable deposits issued in an amount equal to or less than the reserves.
2. Treasury Money Market Mutual Fund (TMMMF): Assets are Treasury bills or short-term investments collateralized by Treasury bills (i.e., repurchase agreements). Liabilities are demandable equity shares having a proportional claim on the assets.
3. Prime Money Market Mutual Fund (PMMMF): Assets are Treasury bills and short-term Federal agency securities, short-term bank certificates of deposits, bankers' acceptances, highly rated commercial paper, and repurchase agreements backed by low-risk collateral. Liabilities are demandable equity shares having a proportional claim on the assets.
4. Collateralized Demand Deposit Bank (CDDDB): Assets include low-credit- and interest-rate-risk money market instruments. Liabilities are demandable deposits that have a secured claim on the money market instruments and are issued in an amount equal to or less than the money market instruments.
5. Utility Bank (UB): Similar to a CDDDB but collateral can include retail loans to consumers and small businesses in addition to money market instruments.

In the above sequence of examples, asset portfolios are increasingly less restrictive in terms of their credit- and interest-rate risks. Another difference in these examples is the composition of liabilities. Some narrow banks issue only equity shares (TMMMF and PMMMF). Such a liability structure limits the bank's assets to cash and marketable securities for which a net asset value (NAV) could be readily computed to buy and redeem equity shares. An alternative liability structure (CDDDB and UB) is to issue both demandable deposits and nonredeemable equity capital. Under this structure, the bank is permitted to set the interest rate on deposits, as opposed to having it determined by the returns on the bank's assets, as in the case of the all-equity narrow bank. Gorton & Pennacchi (1993) note the freedom to set deposit rates allows banks to exercise greater market power and also to invest in some nonmarketable assets because a NAV is not required to redeem deposits.

## **2. NARROW BANKS IN HISTORY**

Prior to the twentieth century, British and American commercial banks lent almost exclusively for short maturities. Primarily, loans financed working capital and provided trade credit for borrowers who were expected to obtain cash for repayment in the near future. The real bills doctrine, also called the commercial loan theory of liquidity or credit whose origins can be traced to John Law and Adam Smith, was the guiding theory of bank operations during the nineteenth century. Per this doctrine, the main function of banks is to create a sound currency by issuing notes or deposits that are backed by short-term “self-liquidating” loans.<sup>1</sup> Loans often were bills of exchange which financed trade and were collateralized by the goods in transit. Promissory notes were another common loan backed by a borrower’s and any cosigners’ or guarantors’ personal wealth. Both types of loans had short maturities, typically averaging between 65 and 80 days. Bodenhorn (2000) confirms this range of loan maturities from the records of three US banks during the 1850s and early 1860s. Scottish banking statements of the real bills doctrine also required that banks lend at a maturity of no more than 60 days.

Following the US Civil War, many banks with insufficient loan demand and surplus funds invested in commercial paper, which were promissory notes issued by corporations and often sold through commercial-paper dealers (Greef 1938). With the establishment of the Federal Reserve System in 1913, commercial paper became especially desired because it was eligible collateral for borrowing from the Fed’s Discount Window. According to Foulke (1931), prior to the 1930s, banks and trust companies held more than 99% of commercial paper. Banks were attracted to its high credit quality and short maturity. In contrast, banks today hold very little commercial

paper. The Federal Reserve *Flow of Funds* data on ownership of “open market paper” estimates that, as of the fourth quarter of 2011, commercial banks, savings institutions, and credit unions each held less than \$1 billion, while money market mutual funds (MMMFs) held \$355.1 billion.

One credit service of banks that is ubiquitous today but was completely absent from banks in the nineteenth and early-twentieth centuries was the loan commitment. In recent years, more than 70% of business lending was from loan-commitment drawdowns.<sup>2</sup> Prior to the 1930s, banks often had long-term relationships with particular borrowers: Banks would lend repeatedly for short terms to the same borrower. Using the records of the Black River Bank, an apparently typical bank located in Watertown, New York, Bodenhorn (2003) found that in 1855 the bank made 2674 loans to 978 different borrowers, with an average loan maturity of 68.2 days. Only 3.5% of these loans were renegotiated and extended at maturity. During the financial panic period of 1857--1858, the bank's number of borrowers declined by nearly 75%, though higher quality and longer-relationship borrowers were more likely to continue receiving loans.

However, early banks made virtually no formal loan commitments. According to Summers (1975), longer-term loans, term loan commitments, and lines of credit first appeared in the 1930s. He states, “Early usage of revolving credits was very limited, their number being estimated as only 5 percent of the number of term loans outstanding in 1941. There appears to have been resistance on the part of banks to enter revolving credit arrangements, presumably due to uncertainties involved with credit usage.” (Summers (1975), page 20).

Although restricting bank assets to short-maturity, high-credit-quality loans and investments was considered prudent banking practice, for the most part it was voluntary and not followed by all banks. An exception where such a practice was mandated by law occurred with the passage of the Louisiana Banking Act of 1842. The impetus for this legislation was the economic and financial crisis that started in 1837 and led to a suspension of convertibility by New Orleans banks.<sup>3</sup> As detailed in Sumner (1896) and Hammond (1957), this act required a bank to hold specie (gold) and bills of exchange and promissory notes maturing in 90 days or less in amounts at least equal to its deposits and notes issued. Moreover, the ratio of specie to the total of deposits plus notes had to be at least one-third. The bank could make loans with maturities greater than 90 days, such as mortgages, and hold real estate and other fixed assets but they must be funded with equity capital, not deposits or notes. Thus, equity capital must exceed all the bank's assets that do not qualify to back the bank's deposits and notes.<sup>4</sup> In summary, the act mandated a CDDB with required collateral in the form of specie and short-term bills of exchange and promissory notes.

The system established by the Louisiana Act of 1842 continued until the Civil War. Hammond (1957, p.683) states, "The available evidence is that the system operated with distinguished success...Although the banks of New Orleans were well known throughout the country for their strength and integrity, the law governing them was not generally emulated." Sumner (1896, pp. 387, 389) is more enthusiastic, calling the act "the most remarkable law to regulate banks, which was produced in this period, in any State...It obviously proceeded from very mature study of the principles and practice of banking, and may justly be regarded as one of the most ingenious and intelligent acts in

the history of legislation about banking. Probably it could not have been passed except at just such a crisis in banking affairs.”

In summary, prior to the early-twentieth century, many US banks functioned similarly to narrow banks by holding primarily short-maturity assets to match their short-maturity liabilities. Despite the several episodes of banking panics, it may be argued that panics occurred primarily at banks that deviated from the narrow-banking ideal. However, the typical structure of these early banks contrasts with the modern view of banks, according to which the received wisdom is that “[t]he principal function of a bank is that of maturity transformation---coming from the fact that lenders prefer deposits to be of a shorter maturity than borrowers, who typically require loans for longer periods” (Noeth & Sengupta 2011, p.8). Indeed, maturity transformation is the starting assumption of many theories of banking, such as that provided by Diamond & Dybvig (1983). Yet, historically, maturity transformation was often considered a violation of prudent banking.

The financial panic of 1907 led to greater government interventions in banking, thereby creating fundamental changes in banking operations. One reaction to the panic was the creation in 1910 of the US Postal Savings System, which operated as a type of narrow bank (Jessup & Bochnak 1992). The system took individuals’ deposits and invested them in Treasury securities or deposits at local banks that pledged Treasury securities as collateral (c.f., TMMMF). The system’s design contained flaws, however, because savings interest rates and rates paid to banks on deposits were legislatively fixed.<sup>5</sup>

A more important response to the 1907 panic was the establishment in 1913 of a government lender of last resort and central bank in the form of the Federal Reserve

System. Access to the Fed's Discount Window made it less costly for banks to hold longer-term and more illiquid loans.<sup>6</sup> Indeed, Friedman & Schwartz (1963) argue that the Fed's existence changed banks' behavior in ways that led to more bank failures during the early 1930s. Banks shifted to higher credit-risk loans and felt less need to lend to each other during times of stress because that was now considered the Fed's responsibility (which the Fed failed to perform adequately).

Waves of bank failures during the early 1930s led to further government intervention. Most important was the creation of the Federal Deposit Insurance Corporation (FDIC) by the Banking Act of 1933 (Glass-Steagall Act). FDIC insurance reduced deposit withdrawal risk due to bank runs, thereby making leverage less costly. Berger, Herring & Szegö (1995) show that bank capital-asset ratios were trending downward since the 1840s (when they were over 50%), but the decline accelerated following the founding of the Fed and the FDIC. The capital ratio then stabilized in the range of 6%–8% starting in the early 1940s. Although aggregate data on bank asset maturities during the nineteenth century are unavailable, Summers (1975) suggests that they remained short term until after the Fed came into existence. He states, “this basic (real bills) doctrine came to be known in the United States as the commercial loan theory of credit, and it remained the rubric of banking until the 1920's.” (Summers (1975), p.17).

Later, Summers (1975, p.19) states, “Term lending was first introduced in the early 1930's and came as a response to conditions imposed by the Great Depression...Historical data provided by 56 (of the) banks revealed that their outstanding term loans increased three and one-half times from 1935 to 1940...The revolving credit

agreement also appeared about the same time as the term loan.” Thus, it is likely that significant term lending would not have been feasible without FDIC insurance.<sup>13</sup>

Summers (1975, p.19) also states that term lending was encouraged by the Banking Act of 1935, which extended Fed Discount Window collateral to “any sound asset,” including term loans. In more recent times, loan maturities have continued to rise. Data from the Survey of Terms of Business lending indicates that the weighted-average maturity for commercial and industrial loans was 241 days in 1997, rising to 537 days in 2011.

### **3. NARROW BANK REFORM PROPOSALS**

As with other proposed bank reforms, recommendations for narrow banks appear most frequently following major financial crises. With the exception of the Louisiana Banking Act of 1842, and possibly the U.S. Postal Savings System, proposals involving narrow banks have not been implemented. To fully evaluate proposed narrow bank reforms, one must consider the implications in terms of financial services that traditional banks provided but that narrow banks would not offer. In most instances, different financial institutions would provide such services.

An often-cited narrow bank reform was the 1933 proposal by University of Chicago economists known as the Chicago Plan (Phillips 1996).<sup>7</sup> Its main feature required that banks hold reserves (vault cash plus deposits at the Fed) equal to the amount of their demand deposits. With demand deposits secured by reserves, they would be default free, and deposit insurance would be unnecessary. Furthermore, the M1 money supply (currency in circulation plus demand deposits) would not be prone to contractions from bank runs as occurred in the 1930s. Other than this 100% reserve requirement for demandable (and checkable) accounts, a bank could continue the same lending activities

that it previously employed but loans and other assets must be funded with uninsured savings accounts, time deposits, or equity capital. Milton Friedman (1960) also advocated for 100% reserve banking with the proviso that interest could be paid on reserves. The Chicago Plan can be viewed as an RB and CDDDB type of narrow bank. Likely, it would have had little impact on banks' operations prior to FDIC insurance except that demand deposits could not fund loans and investments.

Several related narrow-banking proposals surfaced in response to the failures of thousands of US thrift institutions and commercial banks during the 1980s and early 1990s.<sup>8</sup> Many bank failures were due to 1930s reforms that proved to be ill adapted to the economic environment of the 1970s and 1980s. The Banking Act of 1933 allowed the Fed to set ceilings on banks' deposit interest rates, which it did as part of "Regulation Q." For four decades, these ceilings acted as a price-fixing mechanism that reduced deposit market competition and provided market power (and charter value) to banks. But with high inflation and market interest rates following the 1970s breakdown of the Bretton Woods fixed-exchange rate system, Regulation Q ceilings became a hindrance to banks as disintermediation made it difficult for banks to fund long-maturity loans, such as fixed-rate mortgages. The beneficiaries of banks' regulatory straitjackets were MMMFs, a form of narrow bank. The success and viability of MMMFs were among the reasons motivating bank reforms.

While Regulation Q ceilings were being phased out during the 1980s, banks also faced increased competition for borrowers. Advances in telecommunications and computer technology reduced information costs and gave formerly bank-dependent borrowers access to funding via public securities markets. Greater competition reduced

banks' franchise values and likely raised their incentives to take excessive risks. Models by Merton (1978) and Marcus (1984) show that, when banks have insured deposits and their charter value declines, they will switch from a strategy of reducing asset volatility and leverage to one that raises them. Whether motivated by this moral hazard or a view that other financial services were more profitable and could diversify risks, most large commercial banks wanted Glass-Steagall underwriting restrictions lifted so that they could enter investment banking. Several hoped to become financial conglomerates offering "one-stop" financial servicing.

Litan's (1987) proposal would not affect individual banks that provide only traditional lending and deposit taking. However, it would require nontraditional banking services, such as underwriting and proprietary trading, to be financed with uninsured, non-deposit liabilities. Acknowledging that social welfare may be enhanced when individual firms offer a broad range of financial services, his proposal allows firms to combine deposit-taking and nonbanking financial services but only by forming a financial holding company (FHC). An FHC could issue deposits only from a narrow-bank subsidiary.<sup>9</sup> The FHC's lending and investment banking services must occur in a separate subsidiary funded only by uninsured liabilities.

Tobin (1987) proposes narrow banks called deposited currency accounts (DCAs). One way they could be offered to investors is directly from the Federal Reserve but marketed at private banks or postal offices. The accounts would pay interest sufficiently below the Treasury bill rate. Alternatively, private banks could offer them with the funds invested in reserves or Treasury bills of no more than three months maturity. In addition to DCAs, "commercial banks" eligible for deposit insurance could hold only loans and

investments of short duration and limited credit risk. All other more risky activities would need to take place in “investment banks” funded by uninsured debt and equity. Thus, Tobin’s plan envisions a system that includes both a TMMMF (DCA) and a UB (commercial bank).

Bryan’s (1988) plan is similar to Litan’s (1987) in which “risk-free” depository institutions must hold portfolios “with no significant credit risk (such as government obligations or securities rated AA or better) and no significant interest-rate risk (such as floating-rate risk or short-term bonds and notes).” These institutions would carry deposit insurance at low premium rates, and only they would have access to the payments system. Higher-risk loans, investments, and investment banking activities must be carried out in separate firms or subsidiaries funded with uninsured liabilities. Bryan suggests that migration from the present system of risky banks could be accomplished by imposing increasingly higher regulatory capital requirements for risky assets and activities. This would “encourage the depositories to migrate all risk off their balance sheets either by placing them with commercial finance affiliates or by securitizing them.”

Pierce (1991) offers a similar plan, calling his narrow bank a monetary service company (MSC). It would operate as a CDDDB, though all of its assets would need to have low interest rate and credit risks similar to those of PMMMFs. The Federal Reserve would supervise MSCs and insure their deposits. MSCs could operate as stand-alone institutions or be part of a financial or nonfinancial holding company. All other financial services would be performed by financial service companies (FSCs) funded by uninsured liabilities and subject to much less regulation, though FSCs may have access to the Fed’s Discount Window on an emergency basis. If FSCs were to issue high-credit quality,

short-term debt, it could be purchased by a nonaffiliated MSC. Pierce recommends transitioning to this new system by gradually reducing de facto and de jure deposit insurance, as well as raising capital requirements, for banks that do not convert to an MSC structure.

Pollock (1993) believes the aforementioned narrow-banking proposals “are going in exactly the right direction, but tend needlessly to complicate the issue by proposing separate narrow bank corporations and dubious holding company relationships.” Pointing to the Louisiana Bank of Act 1842, he advocates the simple “collateralized money” approach of the CDDB. Demand deposits would be collateralized by high-quality marketable assets under a regulation similar to SEC Rule 15c3-3 (“customer protection rule”) that requires broker-dealers to hold at all times sufficient liquid assets as collateral for their customers’ accounts. All other nondemandable bank liabilities would be uninsured. Other than requiring banks to report daily their demand deposits and collateral, regulation can be greatly reduced.

Merton & Bodie (1993, p.5) advocate the same CDDB, making “collateral be equal to 100% of transactions deposits and that collateral should be restricted to US Treasury bills or their equivalent.” Their proposal would not prohibit financial firms that issue transactions accounts from engaging in other financial activities: “Thus, our proposal does not eliminate any opportunities for economies of scope or scale from ‘one-stop shopping’ for customers of financial services.” Merton and Bodie deem government insurance of savings deposits to be unnecessary because there are many available default-free instruments; one example is TMMMFs. They do not advocate forbidding PMMMFs

from offering check-writing, but they do think it is undesirable for these funds to maintain a fixed NAV because investors might wrongly think they are risk free.

The 2008--2009 financial crisis generated new narrow-banking proposals. Mervyn King, Governor of the Bank of England, supported separating the functions of banks into those that were “utility” in nature from those that involved risky financial activities.<sup>10</sup> Financial functions are considered a utility if their uninterrupted supply is essential and/or their efficient provision entails a natural monopoly. Provision of payments settled by a central (bank) clearinghouse would be considered a utility. Only the utility functions of banks would qualify for deposit insurance and be regulated. He did not specify how “narrow” the activities of the UB would be, but at a minimum, UBs could not use government-insured deposits to fund proprietary trading (the Volcker rule). At the other extreme (see Kay 2009), UBs may be quite narrow such that they are permitted to hold only government securities. However, a middle-ground proposal would allow UBs to lend to consumers and small businesses, because “retail” loans to these traditionally bank-dependent borrowers could constitute a utility function. Similarly, in 2011, the U.K. Independent Commission on Banking required large U.K. banks to “ring-fence” retail and payments-related banking operations in a separate subsidiary. Activities related to security trading and dealing would be prohibited and the subsidiary’s wholesale funding would be limited.

Kotlikoff (2010) proposes a reform that foresees a greater role for mutual funds. Narrow banks called cash mutual funds would operate as an RB and provide payments services. Risky lending would ultimately be financed by mutual fund investors in the following manner: After receiving a loan application, a private bank sends it to a

government agency called the Federal Financial Authority (FFA), which verifies the applicant's creditworthiness and assigns a numerical rating to the loan. A public auction of such loans is then held; these loans would be bought by mutual funds who issue equity shares to investors. Presumably, unless there is a liquid market for the underlying loans, these mutual funds would be closed-end, and liquidity would be provided to the mutual fund investors by having their shares trade on a secondary (stock) market. Thus, by securitizing loans and funding them with equity shares, financial institutions avoid the direct costs of bankruptcy (as when banks finance loans that lose value).

Another recent proposal by Ricks (2011) envisions CDDBs that would be eligible for deposit insurance and pay risk-based insurance premiums. Different from other proposals, under this plan, the Fed would set adjustable restrictions on the risk of CDDBs' portfolios. The Fed may start by allowing the CDDBs to hold only the safest of securities (cash reserves and Treasury bills), but later it could permit assets of increasing risk, such as consumer and business loans, until the Fed deems there is an adequate supply of investments to support the payments system. Moreover, if the Fed allowed CDDBs to hold riskier portfolios, it would simultaneously raise capital requirements and adjust risk-based deposit insurance premia. This plan would also forbid other (non-CDDB) financial firms from issuing short-term debt (deposit-like) claims, thereby preventing them from performing maturity transformation. Thus, via regulation, Ricks (2011) restricts deposit-like claims to CDDBs and reduces the chance that "runs" would occur in the "shadow" banking sector.

## 4. ANALYSIS OF NARROW BANK REFORMS

Narrow bank reforms have been evaluated using different theoretical frameworks. This section gives a critical review of several of them.

### 4.1. Model by Diamond and Dybvig

One branch of analysis considers narrow banking in the context of the model by Diamond & Dybvig (1983) (hereafter, DD). DD is a model of maturity transformation. A mutual (depositor-owned) bank is assumed to issue demand deposits that can be withdrawn after either one or two periods, at the discretion of the individual depositor. However, the investment that the bank makes with depositors' funds pays a high return only if it is not liquidated after one period but is held for two periods. Specifically, liquidating the investment after one period produces a per-dollar return of  $R_1$ , whereas holding the investment for two periods produces a per-dollar return of  $R_2 > R_1$ .

Importantly, depositors are initially uncertain regarding the date that they prefer to consume and, hence, when they prefer to withdraw their deposits to purchase consumption. However, after one period they find out, and those depositors who prefer to consume early withdraw immediately, forcing the bank to liquidate part of its investments. Those depositors who learn that they prefer to consume late may choose not to withdraw but “roll over” their demand deposit for another period until their preferred consumption date. If late consumers do withdraw deposits after one period, they do not earn any additional return over the second period.

Under particular assumptions, DD show that the socially optimal return that the bank will promise to depositors is a one-period deposit return that exceeds  $R_1$  and a two-

period return that exceeds  $R_1$  but is less than  $R_2$ . This demand-deposit interest-rate schedule potentially provides “liquidity insurance” against the uncertainty of consuming early. It benefits individuals by smoothing consumption relative to the situation where individuals directly hold the investment. Direct investment, the so-called autarkic equilibrium, implies that the individual obtains  $R_1$  if he turned out to be an early consumer and had to liquidate the investment directly and  $R_2$  if he turned out to be a late consumer.

However, the demand-deposit contract is beneficial only if the late-consuming individual chooses not to withdraw his deposit after one period. Such an action is privately optimal if the late consumer believes other late consumers will not withdraw. This is the “no bank run” equilibrium. But there also exists a “bank run” equilibrium where the late consumer finds it privately optimal to withdraw after one period if she believes other late consumers also will withdraw. This is due to the bank’s “sequential servicing” where the first depositors to withdraw are paid their promised deposit interest in full until the bank fully liquidates its investment, at which time remaining depositors receive nothing. In this case, the expected return to all depositors is only  $R_1$  because the bank ends up liquidating all of its investment and failing.

Thus, one important insight of DD is that maturity transformation carries with it the possibility of runs. In my view, this is a robust result that holds even for nonbank institutions. When an institution funds a long-term investment by issuing short-term debt, a run by the short-term debt holders is possible if selling the long-term investment incurs liquidation or “fire-sale” costs or if the institution cannot access a lender of last resort.

Such a run equilibrium obtains if short-term debt holders believe other investors will not rollover their debt. Thus, runs can be a self-filling phenomenon when investors “lose confidence.”

DD further show that a deposit insurance scheme that is financed by a tax on all individuals after the first period can eliminate the bank run equilibrium, leaving only the “good” no-bank run equilibrium. Hence, with deposit insurance, the deposit contract that provides optimal insurance against early consumption risk can be implemented. The conclusion from DD is that insured-bank demand deposits provide optimal risk sharing for depositors when maturity transformation is inevitable.

Jacklin (1987) analyzes the DD model in more depth and derives several new results. First, under DD’s assumptions, an optimal liquidity insurance contract can be implemented by a firm, such as a mutual fund, that buys the investment and pays dividends each period. All consumers would buy the firm’s shares at the initial date. Those who turn out to be early consumers obtain their first-period dividends and sell (or redeem to the fund) their shares at the market price. Late consumers use their first-period dividends to buy shares at the market price. Notably, this “equity share” contract provides the same optimal risk sharing as the demand-deposit contract but is immune from the “run” equilibrium.<sup>11</sup> In this sense, an equity-share contract, perhaps taking the form of a mutual fund, seems preferable because it does not require government intervention to insure deposits. The equity-share contract differs from the demand-deposit contract because consumers trade dividends for shares. Trading can occur in a secondary market (the case of a closed-end mutual fund) or internally (the case of an open-end mutual fund).

Second, Jacklin (1987) further examines the DD model but with more general consumer preferences. In this extended setting, differences emerge between demand deposits and equity-share contracts in terms of their liquidity insurance. For some parameter values, both the demand deposits and the equity-share contracts achieve optimal risk sharing; that is, they both provide the best liquidity insurance. However, for other parameter values, only the demand-deposit contract achieves optimal liquidity insurance. Thus, one may conclude that the demand-deposit contract has superior risk sharing.

Focusing on this second result, Freixas & Rochet (2008, p. 223) use the DD-Jacklin framework to discuss how narrow banking may compare to the demand-deposit contract. However, they note that there are several interpretations of what constitutes a narrow bank. One extreme assumes that a narrow bank must have sufficient liquidity after one period to meet all possible withdrawals, even if there were a run. This implies that the entire investment must be liquidated after the first period, giving all consumers a return of  $R_1$ , the same expected return as in the bank run equilibrium and worse than even autarky. This is Wallace's (1996) interpretation of a narrow bank and leads to his conclusion that imposing narrow banking would destroy the banking system because individuals would prefer autarky. A second interpretation of a narrow bank is to assume that it liquidates only what is needed to meet withdrawals by early consumers and liquidates the remainder only if a bank run emerges. This leads to the autarkic equilibrium. Finally, a third interpretation of a narrow bank assumes that it is a dividend-paying mutual fund; that is, the equity share contract. On the basis of Jacklin's second result, it can be argued

that, even in this case, risk sharing is weakly dominated by the optimal demand-deposit contract. Thus, insured demand deposits may be preferred to narrow banking.

However, a third result from Jacklin (1987) casts much doubt on the validity of this conclusion. He shows that the liquidity insurance benefits of a demand-deposit contract are extremely fragile to a change of assumptions that is arguably most realistic for a modern financial system. The optimal demand-deposit contract is viable only if trading after the first period is ruled out. To see this, suppose we begin from the insured demand-deposit (no bank run) equilibrium. Then, at the initial date, a “deviant” firm forms, holding the investment and issuing a two-period, zero-coupon bond that pays a return of  $R_2$  at maturity.<sup>12</sup> Also suppose that there is a secondary market for trading this bond after the first period. Then Jacklin (1987) shows that an individual would be privately better off by initially investing in this bond rather than putting his savings in a demand deposit at the bank: The market price of the bond after one period exceeds the consumption available from withdrawing demand deposits, whereas the bond’s return after two periods exceeds consumption available from holding the demand deposit for two periods. Hence, when a simple bond market opens, demand deposits that provide optimal liquidity insurance are no longer viable.

Thus, in a financial system that includes securities trading, it is highly questionable whether demand deposits can really provide the liquidity insurance envisioned by DD. von Thadden (1998, 2002) comes to this basic conclusion after analyzing this issue in depth using a richer model. Consequently, the argument that a maturity-mismatched, demand-deposit-issuing bank dominates a narrow bank on liquidity-insurance grounds seems unconvincing. Moreover, empirical evidence also

makes this argument dubious. When returns on similar demandable accounts offered by banks and narrow bank--like MMMFs are compared, the MMMF returns are usually significantly higher.<sup>13</sup>

#### **4.2. Model by Kashyap, Rajan, and Stein**

Another theory that has implications for narrow bank reforms is by provided by Kashyap, Rajan & Stein (2002) (hereafter, KRS). Their model predicts that it is efficient for banks to provide liquidity simultaneously to borrowing firms in the form of loan commitments and to savers in the form of demand deposits. The reason is that loan commitments (or lines of credit) and demand deposits are similar cash-management services. By providing them together, a bank diversifies cash inflows and outflows, thereby conserving the liquid assets it needs to hold to support both types of transactions. If holding liquid assets is socially costly, then banks would minimize this cost by providing these services together.

One implication of this theory, which KRS show is supported by empirical evidence, is that banks with relatively high proportions of transactions deposits tend to have high proportions of loan commitments. Another implication is that the synergistic benefit of combining loan commitments with deposits is greatest the lower the correlation is between deposit withdrawals and commitment drawdowns. Gatev & Strahan (2006) provide evidence on this implication by analyzing bank behavior during episodes of financial market illiquidity, where illiquidity is measured by the commercial paper--- Treasury bill spread. Using data from bank balance sheets and market interest rates from 1988 to 2002, they provide a number of convincing tests in support of the condition that both loans and deposits tend to respond positively to an illiquidity shock.

The KRS theory and the empirical work that supports it cast doubt on the efficacy of narrow-banking reforms. If banks are broken up into separate lending (finance company) and deposit-taking (narrow bank) subsidiaries, then this synergy between loan commitments and transactions deposits would be lost. As KRS (p. 34) state, “if there is a real synergy, a forced switch to narrow banking could lead to large inefficiencies.”

Pennacchi (2006) re-examines the KRS theory and its empirical evidence by asking whether its synergy is derived either from the natural lending and deposit-taking structure of a bank or from a government safety net in the form of FDIC insurance. First, it is argued that the KRS theory implicitly incorporates deposit insurance. Their model assumes that a financial intermediary’s cost of nondeposit debt includes an “adverse-selection” premium that rises with the amount of debt issued to meet loan-commitment drawdowns. However, this adverse-selection premium does not affect bank deposits. It would seem that this asymmetric treatment of debt and deposits must be justified by an implicit assumption that deposits are government insured but nondeposit debt is not.<sup>14</sup> This assumption leads to a bias toward funding loan-commitment drawdowns with deposits rather than nondeposit debt.

Second, in the era before FDIC deposit insurance, the synergistic positive correlation of bank loans and deposits was absent during market illiquidity shocks. Using data on US commercial banks from 1920 to 1933 and from 1988 to 2004, Pennacchi (2006) conducts tests similar to those run by Gatev & Strahan (2006). For both periods, the data come from the Federal Reserve’s sample of “weekly reporting banks.” These banks tend mainly to be the largest ones. The tests confirm the result by Gatev and Strahan that illiquidity shocks during the 1988--2004 period led to simultaneous increases

in banks' loans and deposits, particularly in large time deposits. However, repeating the tests for the pre-FDIC 1920--1933 era shows that an illiquidity shock led to a decline in banks' loans and an insignificant reduction in deposits.

The difference in results between the two periods may not be surprising once one accounts for deposit insurance. Post-FDIC, depositors viewed banks as a "safe haven," so that when there was stress in financial markets (an illiquidity shock), investors moved their funds into banks (particularly institutional investors in the form of large time deposits). Banks could then use this deposit inflow to satisfy loan-commitment drawdowns, explaining the simultaneous increase in loan growth.

In contrast, pre-FDIC, there was no "flight to quality" by investors into bank deposits because investors viewed deposits as default risky. Banks realized this and did not make loan commitments. At times of market stress, banks decreased their lending, most likely because they also perceived a decline in borrowers' creditworthiness.

Pennacchi (2006) presents an additional test that asks whether uninsured MMMFs perform similarly to pre-FDIC uninsured banks or to post-FDIC insured banks. This question is potentially important for narrow-banking reforms because it indicates how stable narrow banks may be during an illiquidity shock and whether they could continue to channel credit to borrowers, say, via their purchases of commercial paper. Using data on MMMF flows from 1975 to 2004, this test shows that, when illiquidity shocks occurred, funds flowed into both retail and institutional MMMFs. Apparently during this period, investors viewed MMMFs similar to banks in the sense that they were safe havens during times of stress. This behavior is consistent with the findings by Gorton & Pennacchi (1993), who examine MMMF flows from 1986 to 1991 when there were 11

different commercial-paper defaults. They find no significant declines in MMMF assets following these defaults.

In related work, Miles (2001) examines inflows into large banks, small banks, and MMMFs in response to a monetary tightening as proxied by a rise in the federal funds rate. From tests performed using IMF data from 1974 to 1999, he concludes that investors perceived MMMFs “as safer than commercial banks and certainly less risky than smaller depository institutions.” Moreover, he finds that, during a monetary tightening, MMMFs increased their purchases of commercial paper. This result is consistent with Kashyap, Stein & Wilcox (1993), who find that firms shift from bank loans to commercial paper during a monetary tightening.

Investors’ view of MMMFs as a safe haven changed dramatically following the September 15, 2008 bankruptcy by Lehman Brothers. The management of the Reserve Primary (money market mutual) Fund, which held a large amount of Lehman’s commercial paper, chose not to support the fund’s \$1 NAV, leading to a “breaking of the buck.”<sup>15</sup> Wermers (2010) shows that the main outflows from P MMMFs were by institutional, rather than retail, investors, and institutional investors tended to reinvest their funds in T MMMFs within the same mutual fund complex. Thus, it appears that investors still considered T MMMFs, but not MMMFs that held privately issued securities, to be safe. The outflow of funds from P MMMFs during the 2008 crisis led the SEC to impose greater safeguards on the credit quality, maturity, and liquidity of MMMF assets (SEC Release No. IC-29132). Also, there are proposals to require a floating NAV for MMMFs (for example, see Squam Lake Group 2011).

Although 2008 marked a change in investors' views on the safety of PMMMFs, it is important to note that during this especially severe crisis period investors also changed their attitude with regard to commercial-bank deposits. Cornett et al. (2011) show that, following the Lehman Brothers bankruptcy, banks lost large (uninsured) wholesale time deposits but gained small (insured) retail time deposits. This is counter to the prior evidence in Gatev & Strahan (2006) and Pennacchi (2006), which found that banks gained large time deposits when there was a liquidity shock.

Thus, during the especially severe 2008 crisis, investors behaved similarly with respect to banks and MMMFs. They withdrew funds from investments that were not fully backed by the full faith and credit of the federal government (uninsured large time deposits and PMMMFs) to ones that were (insured retail deposits and TMMMFs). The US government reacted by expanding guarantees against default to both banks and MMMFs. Notably, after these new guarantees were put in place in October 2008, 396 insured banks and thrifts failed over the subsequent three years at a cost to the FDIC of over \$64 billion.<sup>16</sup> In comparison, there were zero claims under the US Treasury's Temporary Guarantee Program for Money Market Funds, which ended after one year. Since the demise of the Reserve Primary Fund, no other MMMF has reduced its \$1 NAV.<sup>17</sup>

Also related to the KRS model, Mester, Nakamura & Renault (2007) point to another synergy between lending and deposit taking that relates to credit information that a lender gains by monitoring a borrower's transaction account activity. They show that information on a firm's checking account activity can help a lender to monitor the firm's accounts receivables that collateralize its loan. However, if such information is important,

it can be shared if narrow banks that provide checking accounts and finance companies that make loans are different subsidiaries of the same holding company or if narrow banks take the form of a CDDB.

### **4.3. Model by Gorton and Pennacchi**

As discussed above, Jacklin (1987) shows that allowing a market in which consumers can trade equity shares in the underlying investment can sometimes replicate the allocations of the DD model's demand-deposit contract but without the possibility of a bank run. Although certainly true in the DD framework, Gorton & Pennacchi (1990) show that if, instead, the investment is risky and information is asymmetric, lesser-informed consumers may suffer trading losses to "insiders" who are better informed about the equity share value of the investment. Gorton & Pennacchi (1990) then explain why these lesser-informed consumers would choose to form a levered bank that funds its purchase of the risky investment by issuing both debt (bank deposits) and equity (bank capital). By holding and transacting in the bank deposits, the lesser-informed consumers would suffer little or no trading losses to better-informed insiders. This is because the bank's deposits are less information sensitive than the bank's underlying investment. The bank creates "liquidity" in the sense of the market microstructure literature (e.g., Kyle 1985) by splitting the cash flows of its investments into a safer stream (deposits) and a riskier stream (bank equity), and lesser-informed individuals find the former are useful for transactions.<sup>18</sup>

Gorton & Pennacchi (1990) emphasize that banks are not the only firms that create liquidity in this manner. A levered nonbanking firm can make risky investments and fund them by issuing debt and shareholders' equity. The firm's debt could be

interpreted as commercial paper, and lesser-informed investors may find this to be a liquid money market instrument that is an attractive alternative to holding a bank certificate of deposit. MMMFs could then purchase a portfolio of firms' commercial paper and issue shares that inherit the commercial papers' information insensitivity. Lesser-informed consumers can then transact in MMMF shares, rather than in bank deposits. Thus, a financial system composed of narrow banks (MMMFs) and nonbank lenders issuing commercial paper (analogous to uninsured certificates of deposit) could also create liquidity. For a detailed description of how such a system would work, see Gorton & Pennacchi (1992), who further consider the general equilibrium implications.

However, when a bank attempts to create liquidity, Gorton & Pennacchi (1990) point out that its underlying investment may be quite risky and/or the wealth of investors willing to purchase the bank's equity may be insufficient. With too little bank equity relative to the investment's risk, the bank's deposits may not be sufficiently information insensitive. In this case, if a government insures the bank's deposits and funds potential losses with taxes, then deposits become fully information insensitive and the welfare of lesser-informed consumers is raised.

Although government insurance clearly improves deposits' liquidity, it also has detrimental side effects because it generates moral hazard that leads banks to take excessive risks. As discussed above, following FDIC insurance, banks' capital levels declined, their loan maturities increased, and they began offering loan commitments. In short, they became less narrow. Moral hazard probably worsened since the 1970s as banks' charter values were eroded owing to technological changes that led to greater competition for loans and deposits. In principle, this moral hazard could be mitigated by

bank regulation and fairly priced deposit insurance. However, as Stiglitz (1993, p.114) and many others have pointed out, governments face “a tremendous disadvantage in assessing risks and charging premiums based on risk differences.”

Pennacchi (2006) points to a particular type of failure in risk assessment. Both Basel capital standards and FDIC insurance premiums are set in ways that primarily reflect a bank’s (physical) expected losses, not its risk-neutral expected losses. In other words, bank regulation typically fails to differentiate between systematic and idiosyncratic risks. Iannotta & Pennacchi (2011) present additional theory and empirical evidence supporting this claim. The model by Pennacchi (2006) also shows when a deposit-insured bank faces such regulation, its shareholders’ value is increased by taking excessive systematic risks. The intuition is that a bank earns excess returns by investing in loans and securities whose returns incorporate systematic risk premia but its cost of funding fails to reflect these risk premia when regulation does not differentiate between systematic and idiosyncratic risks.

As an example, highly rated tranches of mortgage-backed securitizations had extreme systematic risk and commensurately high yields, yet very low Basel capital requirements. It is not surprising, then, that during the crisis many banks failed because they held such investments. Another example of a banking service with high systematic risk is loan commitments, especially back-up lines of credit for asset-backed commercial paper that funded off-balance-sheet structured investment vehicles. Such credit lines had zero Basel capital charges if they had maturities of less than one year. No wonder many banks issued 364-day lines of credit that effectively supported much of the “shadow

banking system.” Flawed regulation of actual, not shadow, banks was the decisive factor in the growth of this off-balance-sheet activity.

Would the effect of regulatory flaws on moral hazard differ under a narrow-banking reform? To answer this question, consider a reformed system where the lending and transactions functions of traditional deposit-insured banks were separated. Loans would be made by finance companies that issue commercial paper, that is, debt similar to a bank’s uninsured certificate of deposit. Transactions services would be provided by narrow banks similar to PMMMFs that issue redeemable equity shares and invest in a diversified portfolio of the commercial paper that was issued by the finance companies. Considering the lessons of 2008, suppose that these PMMMFs have their shares insured by the government at a fixed NAV (for arguments for federal insurance of MMMF shares, see Bullard 2009).

This setting describes the model by Pennacchi (2006). It is used to compare the subsidy deriving from government insurance mispricing, and the resulting moral hazard, in traditional- versus narrow-banking systems. In the traditional-banking system, the government insures each bank’s (lender’s) certificates of deposit. In the narrow-banking system, each finance company (lender) issues uninsured commercial paper that is purchased by many different MMMFs, and the government insures MMMF shares rather than the commercial paper of finance companies. For both systems, it is assumed that regulation in the form of capital standards and deposit insurance premia fails to incorporate systematic risks, resulting in government subsidies. Comparing these subsidies due to flawed regulation, the subsidy from insuring a traditional banking system is unambiguously larger than that from insuring the MMMF system. Moreover, as the

number of commercial-paper issues in an MMMF's portfolio rises, the subsidy and incentive for moral hazard decline. The intuition is that government guarantees of banks' certificates of deposit are analogous to put options on each of the banks' assets, with exercise prices equal to the payment promised to depositors (Merton 1977). In contrast, a government guarantee of MMMFs' shares is analogous to put options on a portfolio of commercial paper or uninsured certificates of deposit, with exercise prices equal to the MMMFs' fixed NAV.

Subsidies due to flawed risk assessment are smaller for MMMFs because their government guarantees are less valuable than are bank deposit guarantees. This is so for two reasons. First, each commercial paper (or uninsured certificate of deposit) is less risky than the underlying assets (loans) of the bank or finance company lender. Second, each MMMF does not hold just one commercial paper issue, but a diversified portfolio of them, which further reduces the risk of the MMMF's assets. This low volatility MMMF portfolio makes the value of the government's NAV guarantee relatively small. Consequently, any error in the government's risk assessment provides a much lower subsidy to MMMFs, and a much lower incentive to exploit that subsidy, than it does to banks. See Kacperczyk & Schnabl (2011) for an analysis of risk taking by MMMFs during the 2007-2009 crisis.

Yet, with moral hazard constrained at the MMMF level, what about moral hazard by uninsured finance company lenders? With their debt uninsured, these lenders are constrained by market discipline similarly as are other nonfinancial firms. Although it may be argued that some finance companies may become "too big to fail" and investors could expect implicit government support, the justification for aiding them is no different

from the one used to bail out any other large nonfinancial firm.<sup>19</sup> Moreover, Wilmarth (2012) argues that if government insurance is restricted to narrow banks, non-narrow bank financial firms have less incentive to become large and complex because their growth cannot be subsidized by government-insured deposits. Indeed, today's large financial conglomerates may voluntarily break up if they are denied the ability to fund their operations with insured deposits. But even if these firms maintained their size with uninsured liabilities, other forms of regulation, including living wills and explicit size restrictions, can be employed to avoid the temptation of having governments aid large firms.

## **5. CONCLUSION**

During the nineteenth century, US banks were more narrow than they are today, and the narrowest (e.g., those under the Louisiana Banking Act of 1842) appeared resistant to panics. Common modern-banking practices, such as maturity transformation and explicit loan commitments, arose only after the creation of the Federal Reserve and the FDIC.

Many academics and policy makers, including several Nobel Prize--winning economists, have offered thoughtful reform proposals that include narrow banks. My reading of the theory and empirical evidence relating to these narrow bank reforms is that it is generally supportive of them. There appears to be little or no benefits available from traditional banks that could not be obtained in a carefully designed narrow bank financial system. Most importantly, a narrow-banking system could have huge advantages in containing moral hazard and reducing the overall risk and required regulation of the financial system.

In contrast, the reaction by US regulators to the recent financial crisis was to expand the government's safety net by raising deposit insurance limits and by giving more financial firms access to insured deposits. Expanding, rather than narrowing, the activities that are funded with insured deposits is justified if one believes that regulation can contain moral hazard when firms have many, complex risk-taking opportunities. Unfortunately, this belief appears dubious if one recognizes that regulators face political and information constraints.

In my view, there is a need for research that considers the optimal design of a financial system when a government regulator is limited in its ability to assess risk. If models hope to yield useful policy implications, they should account for imperfections in risk-based capital standards and/or risk-based deposit insurance premia that create regulatory subsidies and misallocations of capital. Compared to firms that are government-supported and -regulated, uninsured firms face market discipline that is likely to reduce moral hazard and its distortions. Research needs to better identify those financial services where government support would produce a net social benefit. Services such as maturity transformation and liquidity insurance may not deserve costly government guarantees. Finally, should further research support the general concept of narrow banking, there are still open questions regarding the specific features of these banks. In particular, how narrow should be these banks' assets and should their liabilities should be deposits or equity shares (at fixed or floating NAVs) are questions that need better answers.

## **DISCLOSURE STATEMENT**

The author is not aware of any affiliations, memberships, funding, or financial holding that might be perceived as affecting the objectivity of this review.

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<sup>1</sup>The real bills doctrine maintains that as long as banknotes (and deposits) are issued to finance only short-term productive (real) trading activities, as opposed to longer-term speculative activities, then money creation is not inflationary. It has been criticized as a monetary theory because trading is unlikely to provide a nominal anchor for money. However, the doctrine had microeconomic implications for bank operations that are the focus of this review.

<sup>2</sup>Undrawn loan commitments also are sizeable, equaling 73.9% of bank assets in December 2002.

<sup>3</sup>At the time, New Orleans was the world's fourth largest shipping center. Hammond (1957) attributes the authorship of the act to Edmond J. Forstall, a New Orleans banker and agent of Baring Brothers.

<sup>4</sup>The act had other provisions. If a borrower failed to pay a short-term loan by maturity, his account must be closed and other banks in the city must be informed. Banks' financial statements were reported weekly to a state-level banking supervisor.

<sup>5</sup>Savings deposit interest rates were fixed at 2%, which was below market interest rates during the system's first two decades of existence but was above market rates during the 1930s. O'Hara & Easley (1979) point out that the relatively high savings rates drained funds from thrift institutions during the Great Depression and led to additional failures. The system went out of existence in 1966 primarily because interest rates on insured bank deposits were above 2%, making postal savings uncompetitive.

<sup>6</sup>Phillips & Roselli (2009) note that, prior to the 2008--2009 financial crisis, the Fed was a narrow bank because its liabilities (currency and commercial-bank reserve deposits) were almost 100% backed by federal government debt. During the crisis, the Fed purchased nontraditional assets that exposed it to credit- and interest-rate risk.

<sup>7</sup>The plan was revised in July 1939 under the title "A Program for Monetary Reform." Authors included Paul Douglas, Irving Fisher, Frank Graham, Earl Hamilton, Willford King, Henry Simons, and Charles Whittlesey.

<sup>8</sup>The FDIC reports that, from 1980 to 1995, the number of bank and thrift failures equaled 2368, and another 575 institutions required FDIC assistance.

<sup>9</sup>Litan discusses why the narrow bank's assets should have low credit- and interest-rate risk but does not exactly specify the permitted set of assets. Deposit insurance would be necessary if assets beyond reserves and Treasury bills were permitted.

<sup>10</sup>See speech by Mervyn King to Scottish business organizations, Edinburgh, on 20 October 2009.

<sup>11</sup>The optimal dividends paid by the firm after one period equal the same amount of deposits that are withdrawn by early consumers under the optimal demand-deposit contract. If at the initial date the firm's owners voted on a dividend policy, they would choose this optimal one.

<sup>12</sup>An alternative interpretation is that it is a closed-end mutual fund holding the bond or investment.

<sup>13</sup>See figure 2.13 in Investment Company Institute (2011); it compares the average yield spread between taxable money market mutual funds and bank money market deposit accounts. The spread is usually significantly positive, except during periods of very low nominal interest rates.

<sup>14</sup>Stein (1998) derives the adverse-selection premium for the case of a bank's uninsured deposits, showing that deposits must be insured to avoid this penalty cost of funding in the KRS model.

<sup>15</sup>The Reserve Primary Fund held \$785 million in Lehman commercial paper, which was near the maximum that the fund could hold because the commercial paper had an A2/P2 rating, the lowest that money funds were permitted to hold. The SEC sued the Primary Fund's management for fraud because it delayed writing down its NAV following the decision not to provide support for the fund. Investors in the fund ultimately recovered slightly over 99% of the fund's reported assets prior to its writedown.

<sup>16</sup>Data is from the FDIC's report on Failures and Assistance Transactions. Including failures from the start of 2007, the FDIC's cost is over \$81 billion. This does not include tax-rule changes affecting failed-bank acquisitions that cost taxpayers and tens of billions of dollars in additional losses. See Pennacchi (2010).

<sup>17</sup>The Treasury collected an insurance premium of 1 to 1.5 basis points of each MMMF's assets.

<sup>18</sup>Qi (1996) extends the model by Gorton & Pennacchi (1990) to show that liquidity provision can improve social welfare by allowing the financing of superior investments.

<sup>19</sup>In the recent financial crisis, the US government rescued both auto companies (GM and Chrysler) and a larger insurer (AIG). However, a large finance company was allowed to fail (CIT Group).